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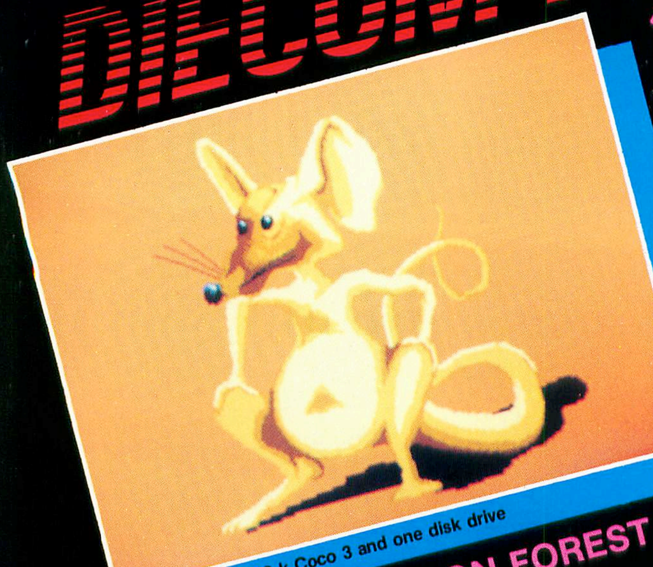

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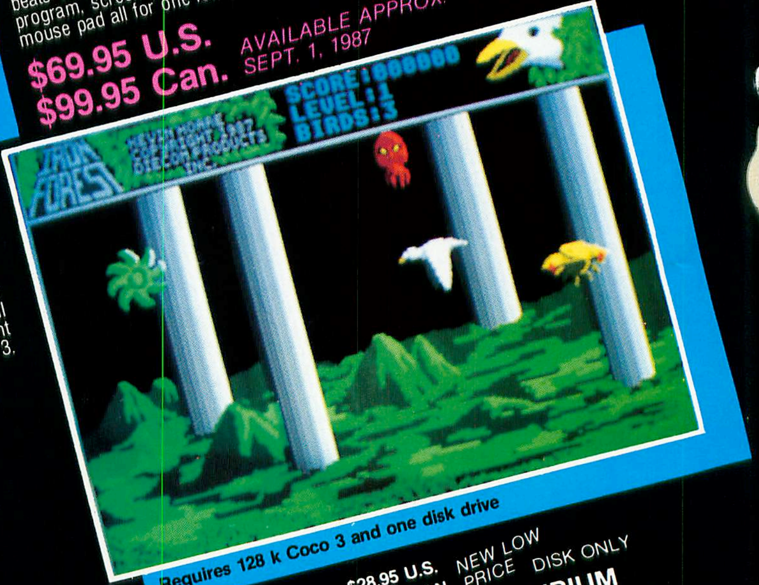

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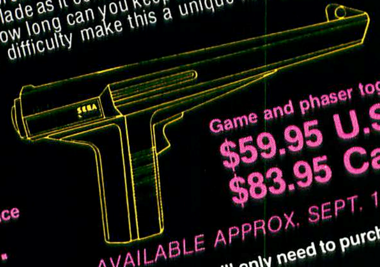

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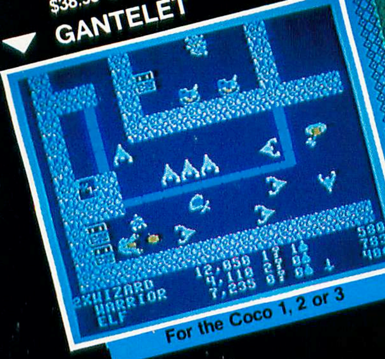

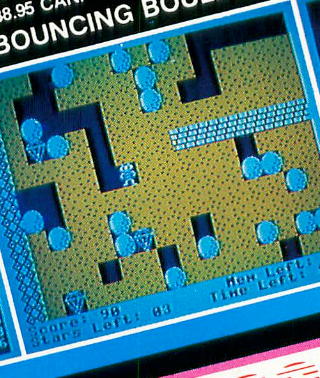

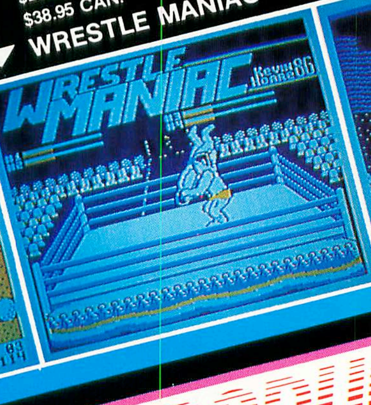

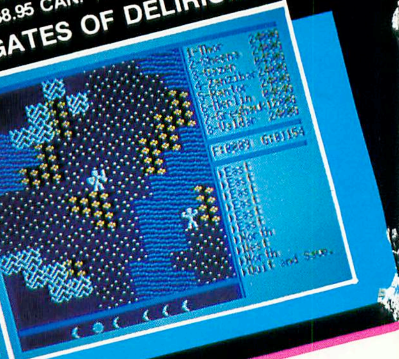

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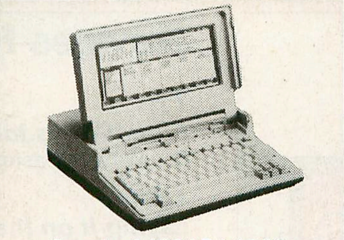

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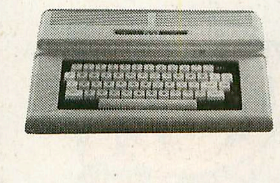

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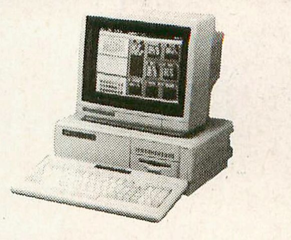

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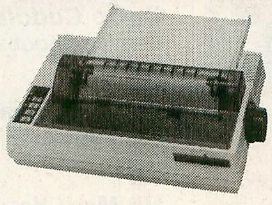

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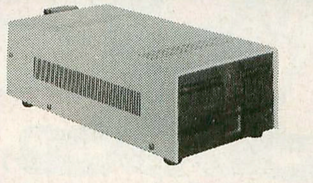

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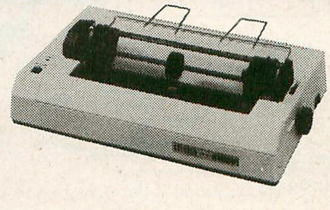

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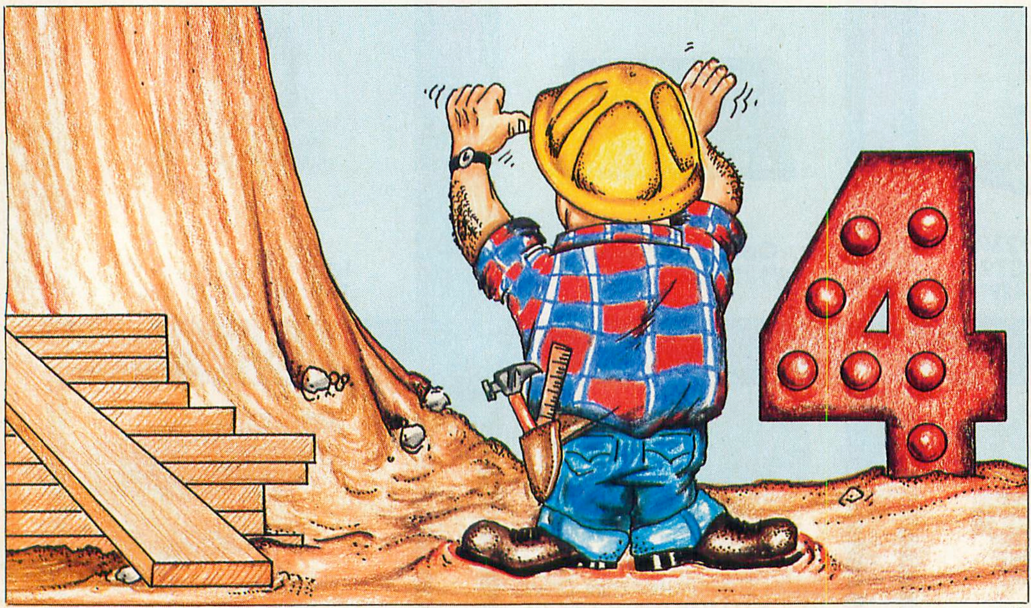

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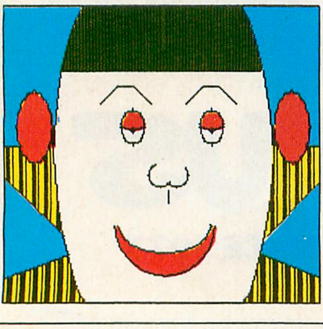

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# Letters to the RAINBOW

## Hop on the OS-9 Bandwagon

*Editor:*

Recently I note a great deal of "OS-9 hostility" in the letters to the editor. While I am by no means an "OS-9 fanatic," I believe that some input is needed from a cooler head.

I have had OS-9 for three years, the first of which was largely spent in "playing around" with the system when I had no other pressing projects pending on my CoCo. Admittedly, for one who cut his teeth on the BASIC in ROM of the CoCo, OS-9 presented obstacles to easy understanding. What was it for, anyway? But even in the early stages it was clear that there was an abundance of power in the system. Certainly, the original Radio Shack documentation was somewhat cryptic, but THE RAINBOW came to the rescue with *The Complete Rainbow Guide to OS-9*. Try running `dsave` as shown in the *Guide* if you want a demonstration of system power! Just watching one demonstration of `dsave` will convince the skeptic of the possibilities of this operating system.

Most of the problems I read about in the letters to the editor involve the inability to understand that every time a new OS-9 disk is inserted in the drive, you *must* do a `chd /d0` and `chx /d0/CMDS`. Is it really too much to expect users to read the manual? No, you can't just sit down with OS-9 and start to "hack." This leads to the statement of Gordley's first law of learning: "The greater the power of the system, the more imperative it is to do some homework."

Facts are facts, and the fact is that Radio Shack is marketing only software written for OS-9. Do you want to customize your system? Have several favorite games/utilities on one disk? Port programs to and from Level I and Level II (i.e., use programs written for the CoCo 3 on the 3)? Then you'd better get on the OS-9 bandwagon, stop complaining and read the manual — including typing in and running examples until you understand that OS-9 is a "manager" of computer power and an incredibly versatile one.

No, OS-9 is not easy. Few things worthwhile are. But it is a system that makes this dirt-cheap computer stand up and dance. Radio Shack got a lot of bad press early on when it released the Model I without software support, etc., but the Color Computer has outlived the I, III, and IV, largely because Radio Shack has devoted a huge amount of development to make this little computer constantly competitive. OS-9 is one facet of this development. Which would you rather do, scrap your system every couple of years or learn new and more powerful operating systems to stay current with the possibilities of more expensive systems?

Sure, PC Compatibles are the wave of "now," not to mention the future, but we now have in the CoCo 3 all the memory and other capabilities of PC clones — how long will it take for someone (probably not Radio Shack, since they have their own line of PC clones) to produce a board or program to make this "little" computer clone-like? Probably not too long as micro-history goes, and you can bet that because of the Shack's commitment to it, it will probably use OS-9 in some fashion.

Yes, the CoCo in its original configuration was incredibly simple, and many learned BASIC with the CoCo's great manuals. And as the CoCo continues to evolve, the same possibilities exist. But serious computer users who remain doggedly faithful to the CoCo are going to have to do some learning. It just isn't realistic to expect this product, which has outlasted all its comparably priced competition, to grind along in a 1970s mode.

Radio Shack has given us a great learning opportunity — don't pass it up.

*Richard D. Gordley*
*Castleton, IL*

*Those of you who are experiencing problems with OS-9 should refer to Cray Augsburg's, "OS-9 — Catch the Wave," Page 166 and Nancy Ewart's "Stalking the Fire-Breathing Dragon," Page 156 for some additional direction in your efforts.*

*If you have read the manual and feel that you do, indeed, understand OS-9, but are still experiencing problems, the following letter may be of some assistance.*

## CoCo Gremlins

*Editor:*

For the last 18 months I have been plagued by gremlins in my CoCo 2 system. The first glitches were caused by inadequate house wiring and the fact that we live in the country on a ranch. So I moved — twice — until I got rid of that problem. My PIA chips went out — one at a time, and I got those replaced.

Then I started in with OS-9. I got some of the weirdest errors that didn't make any sense. I could get a directory, but the system crashed every time I tried to initialize a disk. I got directories from my OS-9 disks, but got "pathname not found," even when I typed everything in correctly, and "no permission" no matter what I tried to do!

I took the computer to Radio Shack (1½-hour drive away) to the "local" repair center four times, but they didn't have any drives of their own to check *that* part of the computer. I sent my drives back to True Data, where they were cleaned and aligned, and HDS replaced my controller. Everyone said the problem was with a part of the system that wasn't theirs (a problem when your whole system doesn't all come from the same place). No one could find anything wrong, but it still didn't work when it was reassembled.

I called BBSs all over the West, and wrote to several "experts." The experts didn't reply, and the people on the boards insisted I just *didn't understand* OS-9. Finally, I located the Sacramento CoCo Club, and made the three-hour drive down to see them. I took my whole system to their experts. In three hours, at a cost of $7 plus gas, they had the problem repaired, and I now have a computer that behaves itself. I also now belong to a CoCo Club at long last, even one three hours away, and the next time I go to a meeting there are interested people from Redding willing to go with me.

The cause of all the problems was *not* my lack of knowledge concerning OS-9, but the edge connectors on my drive cable. One pin out of 34 on the connector for Drive 0 was not operating at all. My poor CoCo was trying to operate with an incomplete set of data coming in!

Is there a lesson in all of this? Probably, but I'm not sure exactly what it is. I do know that the Sacramento CoCo Club was the only group able to figure out what was happening!

*Vicki Daubner*
*Redding, CA*

## Hooked on the CoCo

*Editor:*

When my older brother passed away two years ago, he left me his CoCo. There were no peripherals. I thought, "Right! *Me* with a computer! I'll play with it a while *maybe* and then sell it. I'm almost 50 and can see no use for it in my life." Hah! Boy, did I get hooked! I'm now lucky enough to have purchased a CoCo 3, DMP-105 printer, two FD 501 disk drives, Multi-Pak interface and *much* software (a lot of which I bought at Radio Shack tent sales).

The December 1985 issue of RAINBOW was the first that I bought. That issue gave me the self-confidence to try to learn the CoCo and continue with it. You *all* have helped me through "pangs" of learning typing again, BASIC programming, using OS-9, getting an interest in assembly language and BASIC09. Right now I have OS-9 Level I with Version II upgrade. This past week Radio Shack had another tent sale and I came home with $626 worth of stuff for only $36. Can you believe that? Some things I picked up were BASIC09, Deluxe RS-232 interface and a 300 baud modem (minus a power supply). So, as soon as I get a power supply transformer, I'll be in touch with RAINBOW and other CoCoists on Delphi and BBSs for the *first* time. I can hardly wait.

This is the first time I've written to a

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magazine, but it doesn't feel strange, because I believe I'm writing to friends. I couldn't be at this point in my computing life without all of you. Thanks for everything!

*Evelyn C. "Chris" Gallagher*
*Chino, CA*

### HINTS & TIPS

*Editor:*

I recall a previous issue of THE RAINBOW advising a reader that he would be unable to print in bold type using *Scripsit* and a DMP-105 printer. However, with the following revisions, this is possible. First, back up *Scripsit* on tape. Then insert the following command at the beginning of the program:

```
PRINT#-2,CHR$(27);CHR$(31)
```

The result is an inexpensive word processing system with a higher quality printout. I hope this information will be as useful to other readers as it has been to me. I use my CoCo for college reports, letters, and even to print copies of my resume.

*Joe Jarvis*
*Peoria, IL*

### How Do You Spell Relief?

*Editor:*

What does a keyboard extender cable have to do with a bad back?

Due to chronic back pain, I consulted an orthopedist (MD-type). After X-rays, poking, etc., he concluded that my back problems were posture related. He spoke of a significant rise in back problems since the advent of the personal computer. He said that sitting hunched over a keyboard was like carrying a 200-pound backpack.

Well, the handy-dandy keyboard extender cable sold by Spectrum and designed and built by our own Marty Goodman, sure makes sitting back in a comfortable (and healthy) position easy. Just as welcome is freedom at last from having that "klunky" Multi-Pak sticking out the right side of the keyboard. I housed my keyboard in an empty CoCo 3 case, purchased through Tandy National Parts for $10. Marty's cable is well-designed and rugged. The connectors are the tricky part, but he's done a great job there. I'll be glad to answer any questions anyone has about my experience with this device.

*Richard H. Phillips*
*91 Kingsgate*
*Snyder, NY 14226*

*Those of you who spend long hours at the keyboard should look for Dr. Larry Preble's article in next month's issue which will discuss various other ways to prevent back and neck pain.*

### INFO PLEASE

*Editor:*

I would like to write a program to enable the CoCo to play the card game cribbage. Although I can program, I am not a good card player, so I am having difficulty devising effective strategies for discarding cards to the crib and for deciding what card to play. If there are any cribbage experts out there in CoColand, will you please write to me so we can discuss strategies that could be used in a computer program? Of course, whoever provides me with the strategy I adopt will receive a free copy of the cribbage program and equal credit for the program.

*Bruce Arsenault*
*R.R. 1 Cleveland*
*Nova Scotia*
*Canada B0E 1J0*

### Internally Speaking

*Editor:*

I have a 64K ECB CoCo 2. I am using a monitor without audio. How can I hook up an internal speaker inside the CoCo?

*Sean Stephenson*
*11744 Pinecone Circle*
*Grass Valley, CA 94545*

### Can CoCo Count the Miles?

*Editor:*

I am a runner and would like to know if anyone in the CoCo Community could lead me to a program to log date, distance and time, and ideally calculate time per mile.

*Danny Mote*
*P.O. Box 2782*
*Demorest, GA 30535*

### A Fast CGP-115 Dump

*Editor:*

Can anyone help me? I need a machine language screen dump program for the CGP-115. With my present BASIC program, I do not think I will live long enough to print out some of the wonderful programs that appear in THE RAINBOW.

*Frederick Lunn*
*RR 1, 102 Claremont Cr.*
*Orillia, Ontario*
*Canada L3V 6H1*

## PEN PALS

- I have a CoCo 2 and 3, Multi-Pak, two Speech/Sound Paks (would like to buy stereo pak), DMP-106 printer, DCM-3 modem, two double-sided drives and enjoy computing very much — write and see!

*George Locker*
*Rt. 9 Box 329*
*Benton, KY 42025*

- I have a CoCo 2, a CoCo 3 (512K), two disk drives, a printer, a Smartmodem, a Multi-Pak and a deluxe RS-232. I would like to correspond with other CoCo owners around the world who are interested in OS-9 Level II, machine language and communications. I also operate a BBS on my CoCo 3, online from 8 p.m. to 6 a.m., 300/1200 baud. Call 474-22-0229.

*Roberto Berg*
*Rua Aquidaban, 700*
*Caixa Postal 578*
*CEP 89.200*
*Joinville — SC — Brazil*

- I am 9 years old and would like to have a few pen pals in the Pennsylvania area. I have a CoCo 2, CCR-81 recorder, DMP-105 printer and a Tandy 2000 computer. I will accept all letters sent to me.

*Ed Schenck*
*600A Creamery Road*
*Nazareth, PA 18064*

- I am 14 years old and looking for a pen pal somewhere in the Louisiana area. I have a CoCo 2 upgraded to 64K, FD 500 disk drive, and a DMP-105 dot-matrix printer.

*Chris Bastow*
*503 Oak Ridge Dr.*
*Leesville, LA 71446*

- I am 16 years old and an avid CoCo user. I have a 64K ECB CoCo 2, gray drive, modem and cassette. I also love hardware hacking. Any letters I receive will get a reply.

*Jamin Taube*
*Rd. 2 14 Fredonia Road*
*Newton, NJ 07860*

- I have a CoCo 2 and 3 with three disk drives, a Multi-Pak, Ears, Supervoice, an Avatex 2400 modem and a DMP-130. I'm 34 years old and looking for a pen pal. I will answer all letters.

*Ronald M. Koskovich*
*Greenvalley Lot 60*
*Jackson, WI 53037*

- I am interested in having a computer pen pal, especially female. I just got a CoCo 2, disk drive, and a few games a couple of months ago. I'm 14 and in the process of making a video game.

*Mike Reyno*
*Rt. 7 Box 422B*
*Tucson, AZ 85747*

- I have a CoCo 2 and 3 with FD 501 disk drive, CCR-82 recorder, and a Star NX-10 printer. I am 15 years old and would like to hear from other people around my age. I'm interested in OS-9.

*Derrick Holmquist*
*5842 N. Long Lake*
*Traverse City, MI 49684*

- I would like to get to know some nice people who want to be my pen pals. I have a 64K CoCo 2 with tape system. I am 15 years old.

*Mohamed Hamid*
*36, Marwa Street*
*Dokki — Cairo*
*Egypt*

- Our whole family is interested in having pen pals. We are: Patricia, age 40; Christine, 14; Stacey, 16; Jennifer, 12; and Charles, 11. So we welcome pen pals of any age.

*Patricia Bastian*
*1205 Manor Drive*
*Victoria, TX 77901*

- I am a collector of public domain CoCo 2 and 3 pictures and would like to hear from those who have good pictures they would like to share. I am particularly interested in CoCo 3 pictures.

*Chris Steeves*
*P.O. Box Petitcodiac*
*New Brunswick E0A 2H0*
*Canada*

- I am 15 years old, and my system consists of a CoCo 2 with 64K ECB, cassette recorder, Orchestra 80, Speech/Sound Pak, *EDTASM+* and a modem. I would like to correspond with intelligent people around my age or any age who would like to swap thoughts and ideas. My main interests are science fiction, Adventures and music. Please write me. I'm a friendly person living in a small town where there's no one I can talk to about the CoCo. I'll do my best to answer every letter.

*Joey Vaughan*
*Rt. 2 Box 130*
*Bronson, TX 75930*

- I am 13 years old and looking for pen pals in the South Jersey and Philadelphia areas. I have a CoCo 2, disk drive and a DMP-130 printer.

*Andrew Cooper*
*311 Fern Drive*
*Atco, NJ 08004*

- I am 16 years old and looking for pen pals anywhere in the world. I have a CoCo 2, a cassette recorder and disk drive. Anyone wanting a pen pal, please write to me.

*Carl Lindberg*
*1 West St.*
*Pawling, NY 12564*

## BULLETIN BOARD SYSTEMS

- Come take a flight on the Balloon Port BBS, 24 hours, seven days a week, 300 and 1200 baud. Please use 8/N/1. The system runs on six disk drives and a CoCo 2, has a great online game section, forums, and CoCo downloads! Online since January, 1987. Call 717-273-8444. SysOp: Balloon Meister. Co-SysOp: Chip Hirsh.

*Rick V. Elyar*
*1829 Ashton Drive*
*Lebanon, PA 17042*

- The Top Gun BBS in Baton Rouge, Louisiana, is online 24 hours, seven days a week, 300/1200/2400 baud. We feature online games and over 20 message boards, and pride ourselves in being the only 2400 *CoBBS* BBS in the world (that we know of). Call 504-774-8262. SysOp: Stinger.

*Justin Young*
*3527 Hickorywood Ave.*
*Baton Rouge, LA 70807*

- There is a new BBS online in Virginia, accepting 300 or 1200 baud, 7 or 8 bits. It is run on a Wang system and has 20 Mb of software for the CoCo. 24 hours, seven days a week. Call 703-483-3037.

*Ricky Sutphin*
*Rt. 1 Box 020*
*Henry, VA 24102*

- There is a new BBS here in Salt Lake Valley, the West Valley CoCoshop. It's run on Richard Duncan's *CoBBS* Version 1.2 modified. Online 24 hours, 300 baud. We have online games, Xmodem, ASCII downloads and a public message base. Call 801-250-1941.

*Dennis R. Gray*
*3643 S. 6885 W.*
*West Valley City, UT 84120*

- There is a new bulletin board in St. Petersburg, Florida, the Stylus BBS. There are a number of special sections, including three online trivia games, classified ads, music news, concert information, reviews of Box Office & VCR movies, albums, restaurants, etc., as well as an extensive public domain library. Online 24 hours, seven days a week. Call 813-823-1490.

*Tim Jay*
*141 22nd Ave. N.*
*St. Petersburg, FL 33704*

**THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.**

**Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type `RAI` to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type `LET` to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.**

The Best Has Arrived

# Word Power 3

## (The Ultimate Word Processor for the CoCo 3)

**Are** you still using your CoCo2 word processor on the CoCo3 with slip-shod patchwork? You don't have to any more. With Word Power3, Microcom answers the challenge of word processors for the CoCo3. It bridges the gap between "what is" and "what should be" in word-processors. **No other word processor offers such a wide array of features that are so easy to learn and use.** Check out the impressive features:

### DISPLAY

The 80-column display with true lowercase lets you view the full width of a standard page. **All the prompts are displayed in plain English in neat colored windows.** The current column number, line number, page number and the percentage of memory remaining is displayed on the screen at all times. The program even displays the bottom margin perforation so you know where one page ends and the other begins. You can also change the foreground/background color of the screen to suit your needs!

### AVAILABLE MEMORY

Unlike most other word processors, Word Power3 gives you 80K of memory with a 128K CoCo 3 and more than 460K with a 512K CoCo 3 to store text.

### TYPING/EDITING

Word Power 3 has one of the most powerful and user-friendly full-screen editors with wordwrap. All you do is type; Word Power 3 takes care of the text arrangement. It even has a built-in **Auto-Save** feature which saves the current text to disk at regular intervals; so you know that your latest version is saved on disk. Here are some of the editing features of Word Power 3:

Auto-repeat; Key-Click; Cursor up, down, left, right, beginning of line, end of line, next word, previous word, top of text, end of text; page forward, backward; 4-way scrolling; block copy, move, delete; global search and replace (with wild-card search); line positioning (left, right or center); insert/overstrike modes; delete to beginning/end of line, next/previous word; and tabs. You can also embed printer codes in text to take advantage of underlining, sub/superscript and other printer functions. Define left, right, top and bottom margins, and page length.

### MAIL MERGE

Ever try mailing out the same letter to 500 different persons? Could be quite a chore. Not with the Mail Merge feature of Word Power 3. Using this feature, you can type a letter, follow it through with a list of addresses and have Word Power 3 print out personalized letters. It's that easy!

### LOADING/SAVING FILES TO DISK

Word Power 3 creates ASCII format files which are compatible with almost all terminal, spell-checking, and other word-processing programs. It allows you to load, save and kill files and also to create and edit Basic, Pascal, C and Assembly files. Supports double-sided drives and various drive step rates.

### PRINTING

Word Power 3 drives almost any printer (DMP series, EPSON, GEMINI, OKIDATA, etc.). Allows print options such as different baud rates, line spacing, page pause, partial print, multi-line headers/footers, page numbers, page number placement, and right justification. You can also change the values for these print options within the text by using embedded printer option codes.

### INSTRUCTION MANUAL

Word Power 3 comes with a well-written and easy-to-comprehend instruction manual that makes writing with Word Power 3 a breeze.

Word Power 3 comes on disk for only **$69.95.**

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# RAINBOW Info

## How To Read Rainbow

Please note that all the BASIC program listings in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little disk and/or cassette symbols on the table of contents and at the beginning of articles indicate that the program is available through our RAINBOW ON DISK or RAINBOW ON TAPE service. An order form for these services is on the insert card bound in the magazine.

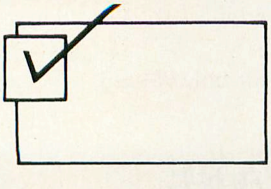
## What's A CoCo?

CoCo is an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

However, when we use the term CoCo, we refer to both the Tandy Color Computer and the TDP System-100 Computer. (While many TDP-100s are still in service, the TDP Electronics division of Tandy no longer markets the CoCo look-alike.) It is easier than using both of the "given" names throughout THE RAINBOW.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and Tandy Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

## Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

*Rainbow Check PLUS* counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS*, type in the program and save it for later use, then type in the command RUN and press ENTER. Once the program has run, type NEW and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

## OS-9 and RAINBOW ON DISK

The OS-9 side of RAINBOW ON DISK contains two directories: CMDS and SOURCE. It also contains a file, `read.me.first`, which explains the division of the two directories. The CMDS directory contains executable programs and the SOURCE directory contains the ASCII source code for these programs. BASIC09 programs will only be offered in source form so they will only be found in the SOURCE directory.

OS-9 is a very powerful operating system. Because of this, it is not easy to learn at first. However, while we can give specific instructions for using the OS-9 programs, you will find that the OS-9 programs will be of little use unless you are familiar with the operating system. For this reason, if you haven't "learned" OS-9 or are not comfortable with it, we suggest you read *The Complete Rainbow Guide to OS-9* by Dale Puckett and Peter Dibble.

The following is not intended as a course in OS-9. It merely states how to get the OS-9 programs from RAINBOW ON DISK to your OS-9 system disk. Use the procedures appropriate for your system. Before doing so, however, boot the OS-9 operating system according to the documentation from Radio Shack.

1) Type `load dir list copy` and press ENTER.
2) If you have only one disk drive, remove the OS-9 system disk from Drive 0 and replace it with the OS-9 side of RAINBOW ON DISK. Then type `chd/d0` and press ENTER. If you have two disk drives, leave the sytem master in Drive 0 and put the RAINBOW ON DISK in Drive 1. Then type `chd/d1` and press ENTER.
3) List the `read.me.first` file to the screen by typing `list read.me.first` and pressing ENTER.
4) Entering `dir` will give you a directory of the OS-9 side of RAINBOW ON DISK. To see what programs are in the CMDS directory, enter `dir cmds`. Follow a similar method to see what source files are in the SOURCE directory.
5) When you find a program you want to use, copy it to the CMDS directory on your system disk with one of the following commands:

One-drive system: `copy /d0/cmds/`*filename* `/d0/cmds/`*filename* `-s`

The system will prompt you to alternately place the source disk (RAINBOW ON DISK) or the destination disk (system disk) in Drive 0.

Two-drive system: `copy /d1/cmds/`*filename* `/d0/cmds/`*filename*

Once you have copied the program, you execute it from your system master by placing that disk in Drive 0 and entering the name of the file.

## The Rainbow Seal

**RAINBOW**
CERTIFICATION
SEAL

*The Rainbow Certification Seal* is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has actually been seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal.

The Seal, however, is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

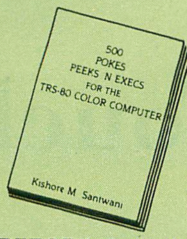
There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

BOOKS & GRAPHICS

# 500 POKEs, PEEKs, 'N EXECs

FOR THE TRS-80 COCO



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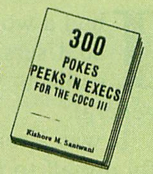

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**Signs**
***Banners***

The CoCo Graphics Designer allows you to create beautifully designed Greeting Cards, Signs and Banners for holidays, birthdays, parties, anniversaries and other occasions. Comes with a library of pre-drawn pictures. Also includes utilities which allow you to create your own character sets, borders and graphic pictures. Requires a TRS-80 COLOR COMPUTER I, II OR III OR TDP-100 with a MINIMUM OF 32K, ONE DISK DRIVE and a PRINTER. compatible with DISK BASIC 1.0/1.1, ADOS 1.0/1.1 AND JDOS. Supports the following printers: DMP 100/105/110/130/430, CGP 220, EPSON RX/FX, GEMINI 10X, SG-10, NX-10 & OKIDATA.

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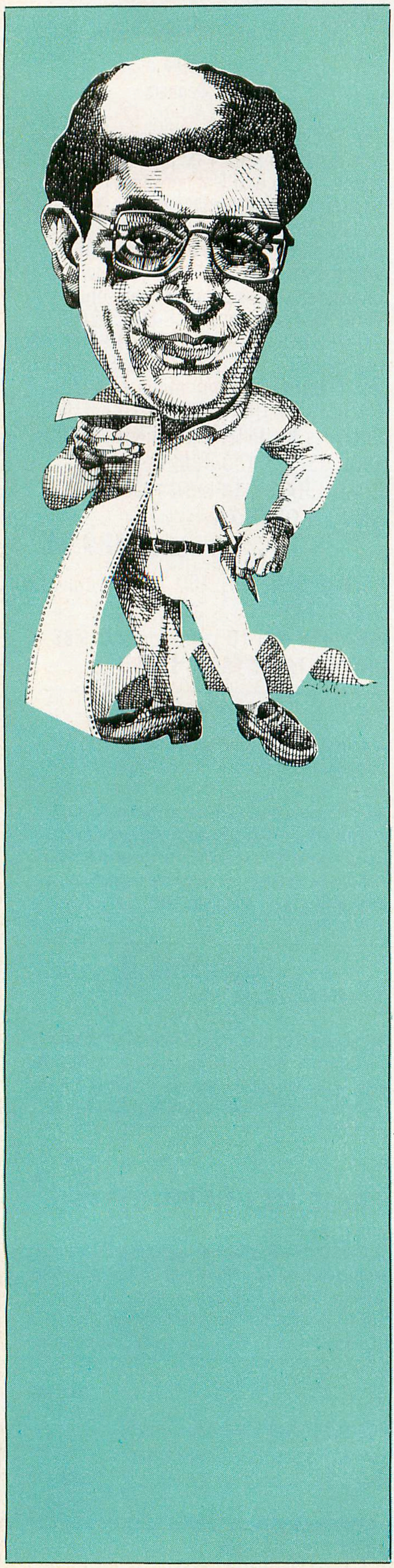

# Keeping in Touch

I had a wonderful time last weekend. At the invitation of the Cincinnati TRS-80 Users Group, I attended their monthly meeting and spoke about two subjects very close to my heart — the Color Computer and computers in general.

It was a real fun day. First of all, the weather was delightful, so I was able to fly myself to the meeting. That meant I was able to condense a one and one-half hour trip into about 45 minutes — including the time Air Traffic Control sent me scurrying around the sky to avoid the "big boys."

Dick White and Don Dollberg met me, and Dick even found the right airport this time. The last time I went to Cincinnati to talk (Larry Preble flew me that time), Dick ended up at the wrong airport and had to drive across town to get me.

I was whisked from Blue Ash airport to the meeting site, spent about an hour talking and another answering questions, and then went out with a whole bunch of the UG members for pizza. Don and Dick drove me back to the airport, I started up the plane and was home in another 45 minutes!

I like Users Group meetings. For one thing, it is always a good opportunity to bounce ideas off the heads of a wide variety of people. And, you get an instant response, as well. Here are some of the questions I was asked:

- *Are the major software companies writing programs for the CoCo, or was that "just some enthusiasm" in one of your columns?*

Well, of course, it was enthusiam, but it is true, too. Most of these programs are being written *for* Tandy, but they are being done all the same. Just look at the titles that are available — plus, of course, all the non-Tandy third-party software.

- *How long will the Color Computer last?*

Maybe forever. I know a few things — although not always as much as people always seem to infer — and it is pretty plain that the CoCo is very much alive and kicking. Look at this magazine, for instance. How many Apple magazines, how many Atari magazines, how many Amiga magazines do you see that have run right around 200 pages in the past year? People are not only *buying* Color Computers, they are *using* them every day. Lots of people.

- *Just how good is the CoCo, really?*

As long as you don't want to do monster spreadsheets, humongous databases (for instance, we don't do our subscriptions on it), write a novel or things of that sort, the Color Computer is probably the only computer you will ever need. And,

# COCO 3 UTILITIES GALORE

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(CoCo 2 versions are available for most utilities)

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An excellent utility to keep track of your bowling scores. Allows you to save scores under individuals or teams. You can edit, change, delete and compare scores. A must for anyone who wants to keep track of his or her bowling performance. Disk **$19.95** (CoCo 2 version included).

## VCR TAPE ORGANIZER

Organize your videocassettes with this program! Allows you to index cassettes by title, rating, type, play time and comments. Also allows you to sort titles alphabetically and view/print selected tapes. If you own a VCR, this program is a must. Disk Only **$19.95** (CoCo 2 version included).

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Receive answers to 30 pre-defined questions on love, success, marriage, etc. This program is over 150K long and yet will run on a 32K–512K systems due to modular approach. Disk Only **$24.95** (CoCo 2 version included)

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# ALL SOFTWARE COMPATIBLE WITH COCO 1, 2 & 3

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**GANTELET: $28.95**
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Except NY. **Order Status,** Information, Technical Information, NY Orders call **1-716-223-1477** when you see *Multi-Vue*, you'll even be able to stick up your nose at the Mac's user interface.

- *Is Tandy really committed to the Color Computer?*

Yes sir, yes sir, three bags full. The reason is simple: The CoCo is profitable for Tandy. Remember, it is a big corporation, and big companies sometimes find it difficult to "express their appreciation" to a customer. I think Tandy does one heck of a job, though. For instance, they gave away 6,000 power controllers at RAINBOWfest in Princeton this year. "It was," an official told me, "one way we could say 'thanks'." Don't be surprised if something else comes down at the Chicago show.

- *How does Tandy support stack up?*

I know of *no* other computer manufacturing company that has the network of free support Tandy does. Of course, they drop the ball on occasion. But at least there is a commitment to have a ball to drop. You have more avenues of free support from Tandy than from any other computer company in the world. And the same goes for their service. Ever try to get an Atari computer fixed? Forget about locally — anywhere. At least in your lifetime.

- *Given all the OS-9 systems Microware has sold to us via Tandy, why don't they show us some support by at least doing some 'image' advertising in* THE RAINBOW?

I dunno. (I love questions like this.)

> ***"You have more avenues of free support from Tandy than from any other computer company in the world."***

- *Are we ever going to see program listings disappear from the magazine? I heard you were going to just print the instructions and let us buy the disks or tapes if we wanted the programs.*

No way. There will always be programs listed in THE RAINBOW.

- *What is your favorite program?*

*Telewriter.* Not only is it a well-done program, but it opened a whole, vast new dimension in software with its high resolution screen for text. Hundreds of programmers use it now, but Howard Cohen was the first. *Telewriter* contributed as much to the success of the Color Computer as anything else.

- *How is Delphi doing?*

Very well, thanks. The CoCo SIG is the most-used area of Delphi, with the other major SIG we offer, PC/MS-DOS, pretty much the second. In fact, except for the original invitation (which was delivered in person), all the arrangements for my coming to this meeting were handled through Delphi Mail.

That's about it, except for some other questions I want to discuss at length later. Thanks, CINTUG, for having me, and thanks, CINTUG members, for listening to me.

And thanks to all of you, RAINBOW readers and members of the CoCo Community, for being with us last year. I look forward to being with you through this new year. To you and yours, a Happy and Healthy 1988!

**— Lonnie Falk**

---

*Two-Liner Contest Winner . . .*

Here's one for those of you who just like to clown around. If you are running it on a CoCo 3, you might want to enter `PALETTE RGB` first.

**The listing:**

```
1 PMODE 3,1:PCLS:SCREEN1,0:M=90:
K=160:L=185:CIRCLE(K,M),60,0,1.5
:CIRCLE(135,80),20,0,1.5:CIRCLE(
L,80),20,0,1.5:CIRCLE(K,110),20:
PAINT(K,110),0,0:CIRCLE(135,M),7
:CIRCLE(L,M),7:PAINT(135,M),3,0:
PAINT(L,M),3,0:CIRCLE(K,150),30,
,.5:PAINT(K,160),3,0
2 CIRCLE(98,M),15,0,1.5,.2,.8:CI
RCLE(222,M),15,0,1.5,.7,.3:PAINT
(99,M),2,0:PAINT(222,M),2,0:PAIN
T(K,40),2,0:CIRCLE(118,30),15,,2
,.4,.9:PAINT(110,30),0,0:CIRCLE(
200,30),15,,2,.6,.1:PAINT(209,30
),0,0:PAINT(135,M),RND(3),0:PAIN
T(L,M),RND(3),0:GOTO2
```

*Rick Cooper*
*Liberty, KY*

(For this winning two-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

---

*Two-Liner Contest Winner . . .*

We often see frost on our windows, but what about on our monitors? This one is for your CoCo 3. If using an RGB monitor, enter `PALETTE RGB` before running.

**The listing:**

```
1 N=90:DIMX(99),Y(99):HCOLOR8,2:
HSCREEN4:FORZ=0TO1STEP0:FORL=1TO
N:X=X(L):Y=Y(L):A=X:B=Y:IFX=0AND
Y=0THENX(L)=RND(638):Y(L)=RND(19
0):NEXTL,Z ELSER=RND(4):IFR=1AND
X>1THENX=X-1ELSEIFR=2ANDX<638THE
NX=X+1ELSEIFR=3ANDY>1THENY=Y-1EL
SEIFY=4ANDY<190THENY=Y+1
2 POKE65497,0:IFHPOINT(X+1,Y)=1O
RHPOINT(X+1,Y+1)=1ORHPOINT(X,Y+1
)=1ORHPOINT(X-1,Y)=1ORHPOINT(X-1
,Y-1)=1ORHPOINT(X,Y-1)=1ORHPOINT
(X+1,Y-1)=1ORHPOINT(X-1,Y-1)=1TH
ENX(L)=X:Y(L)=Y:HSET(A,B,1):NEXT
L,Z ELSEHRESET(A,B):HSET(X,Y,1):
NEXTL,Z
```

*B.J. Bryson*
*Manahawkin, NJ*

(For this winning two-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

# ALL HARDWARE COMPATIBLE WITH COCO 1, 2 & 3

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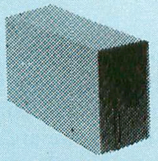
Double Sided, Double Density 360K 40 track disk drives for the Color Computer 1, 2 and 3. Buy from someone else and all you get is a disk drive. Buy from us and not only do you get a quality disk drive, you also get $60 worth of disk utility software (Super Tape/Disk Transfer and Disk Tutorial) and our DISKMAX utility which allows you to use BOTH sides of our disk drives. It's like buying TWO disk drives for the price of ONE!!



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**J&M CONTROLLER** (With RSDOS) **$79.95**
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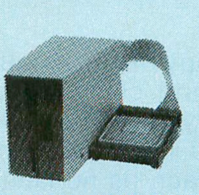

**DRIVE CABLES: 1 DRIVE CABLE: $19.95 2 DRIVE CABLE: $24.95 4 DRIVE CABLE: $39.95**
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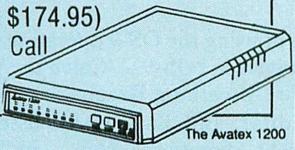

The Avatex 1200

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**Y CABLE:** Use your Disk System with CoCo Max, DS69, etc. ONLY **$24.95**

**15' PRINTER/MODEM EXTENDER CABLE:** ONLY **$16.95**

**MODEM CABLE:** 4 pin to DB 25: **$19.95**

**15" MULTIPAK/ROMPAK EXTENDER CABLE: $29.95**

**3-POSITION SWITCHER:** Select any one of three RS232 devices (printers/modems) from the serial port. **$37.95**

**WICO TRACK BALL: $29.95**

**WICO ADAPTER:** Use Atari type Joysticks with your CoCo: **$29.95**

**RS HI-RES JOYSTICK INTERFACE: $11.99**

**MAGNAVOX 8505/8515/8CM643 Analog RGB Cable: $24.95**

**CM-8 RGB Analog Ext. Cable: $19.95**

**SONY Monitor Cable: $39.95**

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**UNIVERSAL VIDEO DRIVER:** For monochrome or color monitor. **$29.95**

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## PRINTER INTERFACES

**SERIAL TO PARALLEL INTERFACE:** With 6 switch selectable baud rates (300-9600) Comes with all cables. **$44.95**

## EPROM

**INTRONICS EPROM PROGRAMMER:** Best EPROM Programmer for the CoCo. Lowest Price Anywhere. **$137.95**

**EPROM ERASER (Datarase):** Fast erase of 24/28 pin EPROMs. **$49.95**

**EPROMS:** 2764 – **$8.00**, 27128 – **$9.00** Call for other EPROMs.

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**ROMPAK w/Blank PC Board 27xx Series: $12.95**

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**KEYBOARD EXTENSION CABLE:** Why break your back when typing on the CoCo? Our keyboard extender cable allows you to move your keyboard away from the computer and type with ease. You can use your existing keyboard with this cable or leave your present keyboard intact and use a second keyboard. A MUST for all CoCo Users. Only **$39.95**. Cable with CoCo II keyboard: **$49.95**

**COCO 3 KEYBOARD** (includes FREE FUNCTION KEYS software value $19.95): **$39.95**

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**Disk Basic Rom 1.1** (Needed for CoCo III): **$14.95**

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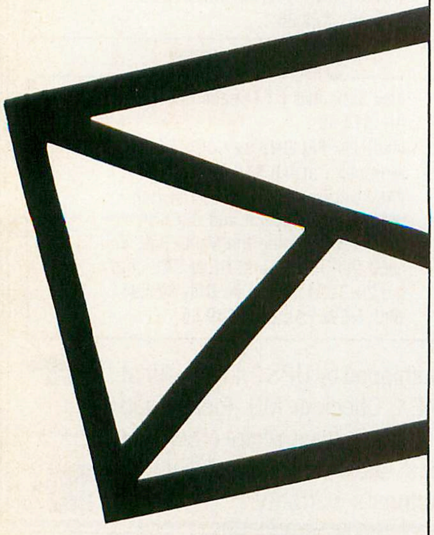


## Building January's Rainbow

# Our Beginners "Boot"

Here it is, January, the beginning of a new year and a year of new beginnings. It's a time when many of us resolve to terminate bad habits and promise ourselves to achieve personal goals. And, just as personal objectives and challenges are established to enhance the year's opportunities, here at THE RAINBOW, we are in the same frame of mind. I'm certain that this, our Beginners issue, can help launch what promises to be a successful year for you, us and the entire CoCo Community.

If you're new to computing, we welcome you to the CoCo (that's our nickname for the Color Computer) Community and THE RAINBOW, where an incredibly diverse group of Color Computer users — all with varying interests and levels of knowledge in computing — share ideas and experiences and learn from each other.

This month, for the many new CoCo users, our Copy Editor, Lauren Willoughby, shares her first experiences as a CoCo beginner and hopes to make yours more enjoyable by showing you the ins and outs of computing in "Starting from Scratch." This special feature includes a staff collaboration of hints and tips, covers the basics of typing, loading and saving programs, and describes the general format of reading the magazine.

To help you understand what you are reading, Lee Veal demystifies some of the jargon associated with computing in " A Glossary of Computer Terms." The coverage is broad and the definitions do not go into any great depth, but the information provided should boost your confidence and help you get a good start in the CoCo world.

Of course, getting started on the right foot is just as important to the advanced users breaking ground in new levels of computing.

If you're interested in learning to program, David Ostler covers some of the most used commands in "BASIC for Beginners"; regular columnist, Joseph Kolar, tutors beginners in "BASIC Training"; and OS-9 guru, Dale Puckett, is back at the OS-9 drawing board with the *KISSDraw* project.

For those who need a better understanding of using the OS-9 operating system, RAINBOW Technical Editor, Cray Augsburg, offers his advice in "OS-9 — Catch the Wave" and Nancy Ewart gives her assistance in "Stalking the Fire-Breathing Dragon."

For the hardware buffs, Contributing Editor, Bill Barden, discusses disk basics — operation, tracks and sectors, file management, directories, etc. — in "Delving Into the CoCo Disk." Hardware specialist, Tony DiStefano, shows you how to add an LED (Light Emitting Diode) to the disk controller, and Ray Onley helps make the CoCo child-proof with a simple-to-build keyboard-locking device.

The emphasis on new beginnings continues throughout this month's programs. To start an organized year, Robert Schlottmann's *Tax Info* helps CoCoists keep tax records in order, Bill Holdorf's *Appointment Calendar* tracks and prints out monthly schedules, and management consultant, Larry Paroubek assists you in "Finding the Right Person for the Job" with a program that creates detailed job descriptions.

But beginning a new year cannot be all work and no play. Some of the fun includes *Usetown Annex*, a Simulation by Paul French that casts the player as a big-time land developer who must build a town from scratch while staying within a budget of $14 million; *Clowns*, by Bill Bernico and George Aftamonow, which allows you to mix and match facial features to create over 100 different clown faces; and *Urchin*, by Eric Tilenius, a short, fun game with an extremely bizarre scenario — giant sea urchins attacking helpless blackboard letters.

And, wrapping it all up is another splendid illustration by our cover artist Fred Crawford, who has been doing RAINBOW's wrapping for five years now! Fred's first cover was that great attacking dragon on our January 1983 issue.

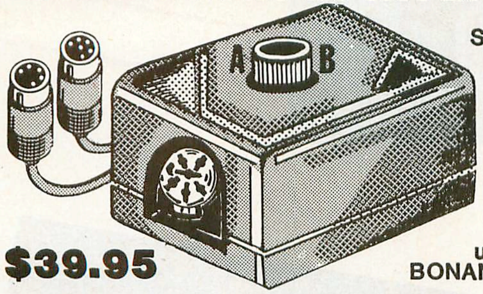
If you're an artist yourself, get ready for our CoCo Gallery competition for the Chicago RAINBOWfest, where the winning entries will be hung in a special exhibition for all RAINBOWfest attendees to view. Details will be announced in next month's issue, but basically, we'll be wanting framed printouts or screen photographs that are ready for display at the 'fest.

So, a month for beginners and the CoCo enters its ninth calendar year, with the best yet to come.

**— Jutta Kapfhammer**

# GREAT COCO III STUFF

## SUPER MAX III INTERFACE



Switch between Color Max III and ???

Use EXISTING SOFTWARE✱ or write your own! Includes ($24.95) HI-RES JOYSTICK utility software BONANZA for FREE !

**$39.95**

✱Compatible with POPULAR CoCo III graphics software programs that use HARDWARE JOYSTICK interfaces ! Bring your CoCo III to the MAX !

## 512K COCO III

**$249.95***

*Includes CoCoIII Software Bonanza package - a $150 plus value !!!

Offer expires 1/20/88

**THE ULTIMATE HOLIDAY GIFT !**

## COLORMAX DELUXE - BETTER THAN COCO MAX III !

It's here! The CoCoIII BREAKTHROUGH PRODUCT everyone was waiting for! 320x200 graphics, pull down menus, icons the choice of any 16 colors from the CoCo III's 64 color palette plus RGB support! Eleven (11) fonts are included for hundreds of lettering styles and painting is a breeze with 16 colors and 32 editable patterns!!! Color Max Deluxe requires a 512K CoCo III and Hi-Res Joystick interface. (Specify printer!) $69.95. Color Max Deluxe Font Editor - create and modify fonts for use with Color Max Deluxe **$29.95.**

FONT DISK #1 $19.95

SPECIAL BONUS - BUY ABOVE 4 for only **$99.95** !!! (**SAVE $35**)

HI-RES Interface $14.95

## TW-80 - 80 COLUMNS FOR TW-64 ON COCO III

See pg.138 10/87 Rainbow review

It's finally here! An 80 column version of Telewriter-64 for the CoCo III with TELEPATCH features plus much, much more! Includes PRINT SPOOLER & (2) ultra-fast RAM DISKS for 512K users, plus changeable CHARACTER FONTS & a setup CONFIG pgm. Req. TW-64 DISK & 128K CoCo III **$39.95** / SPECIAL BONUS COMBO - TW-64 & TW-80 **$99.95**

## SUPER TALK 512 - DIGITAL VOICE FOR COCO III

Turn your 512K CoCoIII into a Digital Voice Recorder! Not synthesized speech, but 100% reproduction of your own voice! Create BIG MESSAGES, up to 32 blocks of 16K each. Req. 512K CoCoIII DISK. From Dr.Preble **$39.95**

## 512K UPGRADE ($49.95*) LOWEST PRICES

OS9 Lev.II Ramdisk Driver $29.95

Easy installation with a superior design for a reliable upgrade. (***$49.95** when purchased with our 512K RSDOS RAMDISK for **$24.95** and our OS9 Lev.II RAMDISK for **$29.95**). Or **$79.95** with either RAMDISK program! Plus, FREE 512K RAM sticker with purchase! 512K upgrade without RAM chips **$29.95.** Cheapest prices in Rainbow, period !!!

## HI-RES JOYSTICK UTILITY SOFTWARE BONANZA !

New useful programs for the Tandy Hi-Res Joystick Interface! Get FULL 640X640 mouse & joystick resolution from BASIC or run CoCoMaxII on the CoCoIII w/o the CoCoMax cartridge **$24.95** w/Hi-Res Interface **$34.95**

## RGB PATCH - NO MORE BLACK & WHITE DOTS ...

Did you buy an expensive RGB monitor (CM-8) just so that you could see your Hi-Res artifacting CoCo 2 games in BLACK & WHITE ??? RGB PATCH converts most games to display in COLOR on an RGB monitor. 128K DISK **$29.95**

## COCO NEWSROOM - 22 FONTS & 50 PICTURES !

Compose your own "CoCo NEWSPAPER" w/BANNER HEADLINES & 6 ARTICLES using a SOPHISTICATED graphics editor with importing of PICTURES, FONTS & FILL PATTERNS from disk. Over 140K of code & WYSIWYG! CoCoIII DISK **$49.95**

## MAGNAVOX 8515 ($299.95*) LOWEST PRICES

Sharper & Brighter than Tandy CM-8!

Do NOT be FOOLED! The CM-8 has a dot-pitch of .52mm & will not work with any other computer or VCR! The '8515' has a SHARP .42mm dot-pitch, will work with IBM PCs/Tandy 1000 and its COLOR COMPOSITE input displays PMODE4 artifact colors unlike the CM-8! ***$299.95** when purchased with a **$24.95** CoCoIII cable - Add **$14** shipping.

CoCo III 512K RAM sticker **$4.99**
Level II Quick Ref Guide **$4.99**
Level II Basic09 binder ..**$9.95**
300 CoCoIII POKES .........**$19.95**
CoCoIII MultiPak PAL chip .**$19.95**
Guide to CoCoIII Graphics .**$21.95**
Better CoCoIII Graphics **$24.95**
CoCo III Unraveled .....**$29.95**
CoCo III Service Manual **$39.95**

**FASTDUPE 512** Format & Backup up to 4 single- /double-sided, 35/40 trk disks in 1 PASS! Even OS9 Lev.II! **$19.95**
**BIG BUFFER** - 437,888 byte spooler for a 512K CoCoIII! Print up to 200 text pages while using your CoCo! **$19.95**

512K Soft-ware

OS-9 Level II Font Editor $29.95

PYRAMIX - Lowest price! $18.95

Both for $29.95

All orders plus $3 S/H (Foreign add $5) - NYS Residents add Sales Tax

**SPECTRUM PROJECTS**
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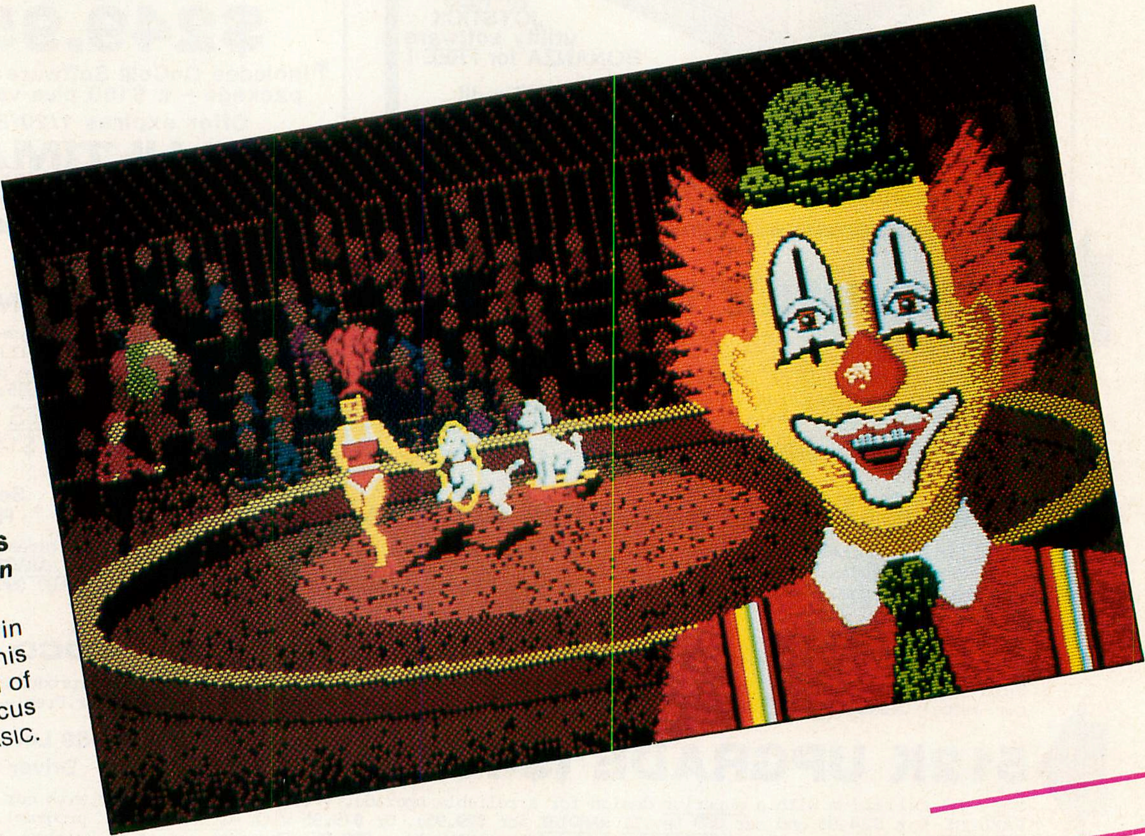
See our other ads on pages 25 & 27

# The CoCo Gallery

1st

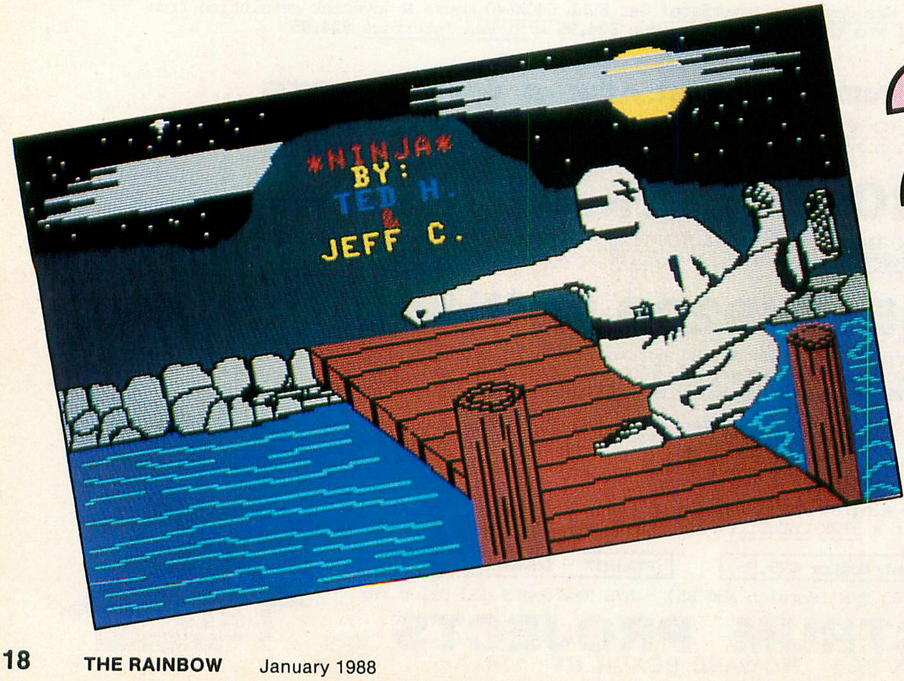
COCO 3



**Circus**
*James A. Upperman*

James, an architect in Amlin, Ohio, devised this entertaining exhibition of a spectacular circus show in BASIC.

2nd



**Ninja**
*Jeffery Chubey and Ted Hildebrandt*

Jeff and Ted live in Roseau River, Manitoba, and used a program Jeff wrote to design this graphic of a ninja warrior. Both Jeff and Ted are self-taught programmers.

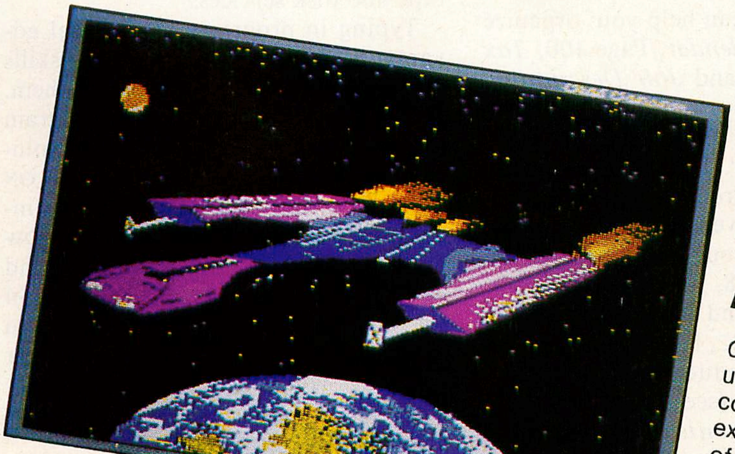
**SHOWCASE YOUR BEST!** You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not an original* work.

We will award two first prizes of $25, one for the CoCo 3 and one for the CoCo 1 and 2; one second prize of $15 and one third prize of $10. Honorable Mentions may also be given.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

**— Angela Kapfhammer, Curator**

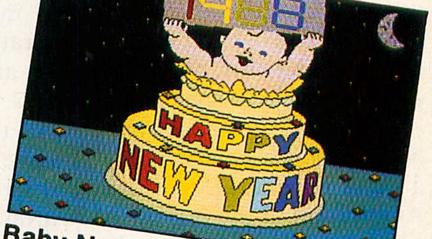


3rd

**Unearthly Visitor**
***Brad Bansner***

Color Max 3 was used so everyone could encounter this extraterrestrial. Brad, of Wyomissing, Pennsylvania, enjoys long-distance road racing and CoCoing.

HONORABLE MENTION



**Baby New Year** ***Logan Ward***

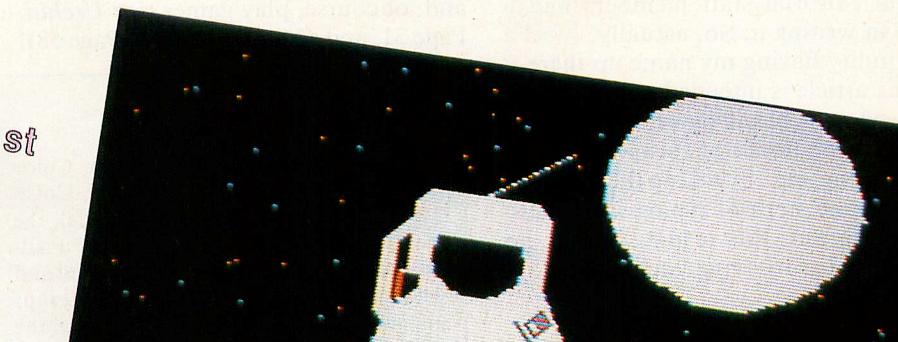
Logan, of Memphis, Tennessee, used Color Max 3 to deliver this jovial message to the CoCo Community.

1st

COCO 1 & 2

**Space**
***Chris Kawchuk***

The CoCo 1 and BASIC were used to create this perspective of a man in outer space. Chris lives in Mississauga, Ontario, and enjoys baseball, music, programming in assembly and drawing in BASIC.



*Tips to get the new user up and running*

# Starting From Scratch

### By Lauren Willoughby

Since this is RAINBOW's Beginners issue, we thought we would give CoCo newcomers a few handy pointers on dealing with their new Color Computers. I'm a beginner, too, new to THE RAINBOW and the CoCo.

"Wait a minute!" you're saying. "If you're a beginner, what can you teach me?" Good question. True, I am an utter novice, and I make stupid mistakes. I know what it is to be frustrated by the I/O Error, the OM Error, and all those other unspeakable nasties.

But this is not exactly a case of the blind leading the blind — I have a distinct advantage. CoCo wizard Cray Augsburg and the rest of the RAINBOW editorial staff are just a wail away. They have become used to my howls of frustration and patiently point out my mistakes.

In fact, my CoCo blunders are what inspired this article, I think. We're not sure exactly how it got started, but several editorial staff members had a hand in writing it. So, actually, I feel a little guilty having my name up there.

This article is intended especially for those who are brand new to computing, covering the basics of formatting, saving, loading, etc., by taking the new user through the steps of typing in a RAINBOW program. But reading this is no substitute for studying your manual!

**It's Set Up — Now What?**

After you have taken your Color Computer, monitor, cassette recorder and/or disk drive from their packages and set them up, you are probably anxious to start "computing." But what is involved in "computing"? What exactly can your CoCo do?

There is a world of programs out there that do amazing things. Your CoCo possesses fantastic capabilities — with software it can help you: organize your life (see *Calendar*, Page 100, *Tax Info*, Page 112, and *Job Description*, Page 106); perform fancy business calculations (see *Payments*, Page 82, and *CoCo Saver*, Page 84); write, by acting as a word processor; draw respectable pictures, even if there's not an artistic bone in your body (see "CoCo Gallery," Page 18, and *Clown Faces*, Page 44); write and play music (check out `MUS1` and `MUS2`, Page 72); learn and teach — as an educational tool, the CoCo is peerless (see *Typer*, Page 82, *Sentence Fragments*, Page 90, and *Fastfood*, Page 54); use programs called utilities to help the computer in its own operation (see *Smoothy*, Page 78, and *Color Tester*, Page 80); plug into an international network (with a telephone, modem and membership in a BBS or online database (see Delphi Ad, Page 122, and the BBS listings, Page 8); and, of course, play games (see *Urchin*, Page 31, and *Usetown Annex*, Page 58)!

But CoCo can do lots more. To get an idea of the possibilities, thumb through this issue and examine both our published programs and the many others available from our advertisers.

The printed programs are for your personal use, just for buying THE RAINBOW. But, first, you will have to decide whether to type them in or rely on our tape and disk services.

Typing in programs has several advantages, improved keyboarding skills and familiarity with BASIC among them. But if the idea of typing in program listings does not appeal to you, a solution would be to purchase RAINBOW ON TAPE or RAINBOW ON DISK, which include all of the programs RAINBOW publishes each month, ready to load and run on your computer (see Page 94 for more details). The typing time you save can be spent using your computer for things you enjoy.

**Preparation**

Before you begin typing in programs, there are a few things you'll need to know. If you own a CoCo 3, you will probably be able to run every program RAINBOW publishes. CoCo 1 and 2 owners, however, won't be able to use the programs written specifically for the CoCo 3 on their machines. And some CoCo 2 programs won't run properly on the CoCo 1.

---

*A recent graduate of Eastern Kentucky University, Lauren Willoughby works as RAINBOW's copy editor. Even though she owns a Commodore, the rest of the staff manages to be nice to her.*

## CoCo History

There are three versions of the Color Computer, or CoCo: CoCo 1, CoCo 2 and CoCo 3. The newer the model, the more power and capabilities it has available. The CoCo 3 is the most powerful and versatile, with 128K (128 kilobytes of memory, but expandable to 512K) and the option of using OS-9 Level II. (OS-9 is a sophisticated and powerful computer operating system).

The first CoCo, which we now refer to as the CoCo 1, started with 4K RAM (Random Access Memory). It wasn't long before ways were found for these machines to access 64K, with 32K available to the user for BASIC programs. All CoCos contain ROM in addition to RAM. The ROM (Read-Only Memory) contains the BASIC language you can use for writing your programs. ROM interprets these programs by explaining to the computer what the program wants to do.

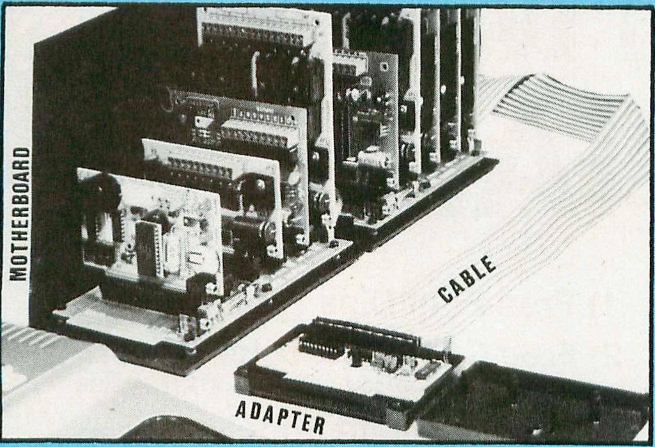
The more recent CoCo 2 offers few capabilities over its older brother. The most notable differences include a smaller, sleeker case design and a completely revamped circuit board layout. A major difference is the lack of a 12-volt supply inside the machine.

The CoCo 1 and 2 are able to use two different BASIC interpreters: Color BASIC and Extended Color BASIC. Extended Color BASIC offers several powerful features not included in the plain vanilla Color BASIC. These added features include math functions and, perhaps more important to many users, high resolution and graphics capabilities.

The CoCo 3 uses only one ROM chip. This chip contains "patched" versions of Color BASIC and Extended Color BASIC, in addition to new programming for the many enhancements in the machine. This added programming for colors, graphics, etc., is often referred to as "Super" Extended Color BASIC. It is because of these additions that most CoCo 3 programs won't operate on a CoCo 1 or 2.

# The Amazing A-BUS

NEW



**An A-BUS system with two Motherboards**
**A-BUS adapter in foreground**

**The A-BUS system works with the original CoCo, the CoCo 2 and the CoCo 3.**

## Plug into the future

With the A-BUS you can plug your PC (IBM, Apple, TRS-80) into a future of exciting new applications in the fields of control, monitoring, automation, sensing, robotics, etc.

Alpha's modular A-BUS offers a proven method to build your "custom" system today. Tomorrow, when you are ready to take another step, you will be able to add more functions. This is ideal for first time experimenting and teaching.

A-BUS control can be entirely done in simple BASIC or Pascal, and no knowledge of electronics is required!

An A-BUS system consists of the A-BUS adapter plugged into your computer and a cable to connect the Adapter to 1 or 2 A-BUS cards. The same cable will also fit an A-BUS Motherboard for expansion up to 25 cards in any combination.

The A-BUS is backed by Alpha's continuing support (our 11th year, 50000 customers in over 60 countries).

The complete set of A-BUS User's Manuals is available for $10.

## About the A-BUS system:

- All the A-BUS cards are very easy to use with any language that can read or write to a Port or Memory. In BASIC, use INP and OUT (or PEEK and POKE with Apples and Tandy Color Computers)
- They are all compatible with each other. You can mix and match up to 25 cards to fit your application. Card addresses are easily set with jumpers.
- A-BUS cards are shipped with power supplies (except PD-123) and detailed manuals (including schematics and programming examples).

### Relay Card RE-140: $129

Includes eight industrial relays, (3 amp contacts, SPST) individually controlled and latched. 8 LED's show status. Easy to use (OUT or POKE in BASIC). Card address is jumper selectable.

### Reed Relay Card RE-156: $99

Same features as above, but uses 8 Reed Relays to switch low level signals (20mA max). Use as a channel selector, solid state relay driver, etc.

### Analog Input Card AD-142: $129

Eight analog inputs. 0 to +5V range can be expanded to 100V by adding a resistor. 8 bit resolution (20mV). Conversion time 120us. Perfect to measure voltage, temperature, light levels, pressure, etc. Very easy to use.

### 12 Bit A/D Converter AN-146: $139

This analog to digital converter is accurate to .025%. Input range is −4V to +4V. Resolution: 1 millivolt. The on board amplifier boosts signals up to 50 times to read microvolts. Conversion time is 130ms. Ideal for thermocouple, strain gauge, etc. 1 channel. (Expand to 8 channels using the RE-156 card).

### Digital Input Card IN-141: $59

The eight inputs are optically isolated, so it's safe and easy to connect any "on/off" devices, such as switches, thermostats, alarm loops, etc. to your computer. To read the eight inputs, simply use BASIC INP (or PEEK).

### 24 Line TTL I/O DG-148: $65

Connect 24 input or output signals (switches or any TTL device) to your computer. The card can be set for: input, latched output, strobed output, strobed input, and/or bidirectional strobed I/O. Uses the 8255A chip.

### Clock with Alarm CL-144: $89

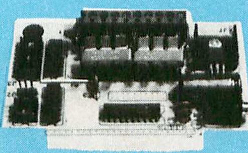
Powerful clock/calendar with: battery backup for Time, Date and Alarm setting (time and date); built in alarm relay, led and buzzer; timing to 1/100 second. Easy to use decimal format. Lithium battery included.

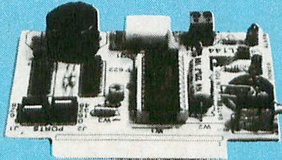
### Touch Tone® Decoder PH-145: $79

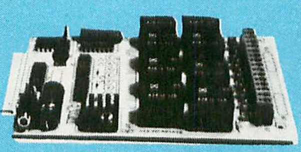
Each tone is converted into a number which is stored on the board. Simply read the number with INP or POKE. Use for remote control projects, etc.

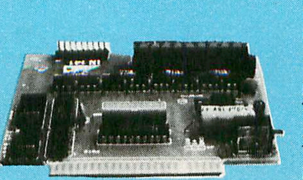
### A-BUS Prototyping Card PR-152: $15

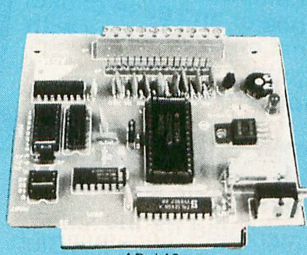
3½ by 4½ in. with power and ground bus. Fits up to 10 I.C.s


ST-143


CL-144


RE-140


IN-141


AD-142

### Smart Stepper Controller SC-149: $299

World's finest stepper controller. On board microprocessor controls 4 motors simultaneously. Incredibly, it accepts plain English commands like "Move arm 10.2 inches left". Many complex sequences can be defined as "macros" and stored in the on board memory. For each axis, you can control: coordinate (relative or absolute), ramping, speed, step type (half, full, wave), scale factor, units, holding power, etc. Many inputs: 8 limit & "wait until" switches, panic button, etc. On the fly reporting of position, speed, etc. On board drivers (350mA) for small steppers (MO-103). Send for SC-149 flyer.

**Remote Control Keypad Option RC-121: $49**

To control the 4 motors directly, and "teach" sequences of motions.

**Power Driver Board Option PD-123: $89**

Boost controller drive to 5 amps per phase. For two motors (eight drivers).

**Breakout Board Option BB-122: $19**

For easy connection of 2 motors. 3 ft. cable ends with screw terminal board.

### Stepper Motor Driver ST-143: $79

Stepper motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with them. Each card drives two stepper motors (12V, bidirectional, 4 phase, 350mA per phase).

**Special Package: 2 motors (MO-103) + ST-143: PA-181: $99**

### Stepper Motors MO-103: $15 or 4 for $39

Pancake type, 2¼" dia, ¼" shaft, 7.5°/step, 4 phase bidirectional, 300 step/sec, 12V, 36 ohm, bipolar, 5 oz-in torque, same as Airpax K82701-P2.

### Current Developments

Intelligent Voice Synthesizer, 14 Bit Analog to Digital converter, 4 Channel Digital to Analog converter, Counter Timer, Voice Recognition.

### A-BUS Adapters for:

| | |
|---|---|
| IBM PC, XT, AT and compatibles. Uses one short slot. | AR-133...$69 |
| Tandy 1000, 1000 EX & SX, 1200, 3000. Uses one short slot. | AR-133...$69 |
| Apple II, II+, IIe. Uses any slot. | AR-134...$49 |
| TRS-80 Model 102, 200 Plugs into 40 pin "system bus". | AR-136...$69 |
| Model 100. Uses 40 pin socket. (Socket is duplicated on adapter). | AR-135...$69 |
| TRS-80 Mod 3,4,4D. Fits 50 pin bus. (With hard disk, use Y-cable). | AR-132...$49 |
| TRS-80 Model 4P. Includes extra cable. (50 pin bus is recessed). | AR-137...$62 |
| TRS-80 Model I. Plugs into 40 pin I/O bus on KB or E/I. | AR-131...$39 |
| Color Computers (Tandy). Fits ROM slot, Multipak, or Y-cable. | AR-138...$49 |

### A-BUS Cable (3 ft, 50 cond.) CA-163: $24

Connects the A-BUS adapter to one A-BUS card or to first Motherboard.

**Special cable for two A-BUS cards: CA-162: $34**

### A-BUS Motherboard MB-120: $99

Each Motherboard holds five A-BUS cards. A sixth connector allows a second Motherboard to be added to the first (with connecting cable CA-161: $12). Up to five Motherboards can be joined this way to a single A-BUS adapter. Sturdy aluminum frame and card guides included.

- The A-BUS is not a replacement for the Multi-pak

**Add $3.00 per order for shipping.**
**Visa, MC, checks, M.O. welcome.**
**CT & NY residents add sales tax.**
**C.O.D. add $3.00 extra.**
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**Overseas add 10%**

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# CHRISTMAS SPECIAL

Good through
January 31, 1987

**FREE DEMO DISK AND COCOSHOW PROGRAM** + **Your choice of:**

1. **Free Font Disk** a $24.95 value
2. **Free CGP–220 Color Driver** the world's best: 125 colors a $19.95 value
3. **The complete Font library (4 disks) for only $29.95** (a $99 value)

When you order CoCo Max III. Only $79.95 including the deluxe hi–res interface.

# CoCo Max™ III

## must be the most enjoyable, useful, and awesome program you've ever seen or your money back.

Instantly,
no questions asked.

**CALL NOW TOLL FREE 1–800 221** Mon–Fri 9 to 5 EST **AND LET THE FUN BEGIN**

**A FEW QUOTES:**

An outstanding program that almost turns your CoCo into a replica of the Macintosh. Terrific hi-res color, very easy to learn and use.
***- Family Computing***

There is absolutely nothing else on the Color Computer that is comparable to CoCo Max's power and ease of use. The most enjoyable time with a computer I ever had.
***- Computerware Review***

I never expected to see anything like it on my CoCo screen. There isn't a single command to remember. Even a person who has no drawing ability like myself can create a presentable picture. I've spent hours just doodling enjoying all the things from silly to the serious. Fascinating experience. Buy it, you won't be sorry.
***- 6809 Express***

*In Everyone's book, CoCo Max is rated again and again as the most incredible product ever marketed for the CoCo.*
*–CoCo America Club*

Note: *There is only one CoCo Max III.* Do not confuse COLORWARE's *CoCo Max* with similar sounding imitations.

# INTRODUCING THE NEXT GENERATION: CoCo Max™ III*

More Resolution More Power More Color Built-in Animation More Speed More Type Styles More Tools Amazing Color Sequencing

## *"The best program ever written for the Color Computer"*

That's how thousands of enthusiastic users rated the **CoCo Max II** drawing program. With **CoCo Max III** we are ready to amaze them again. Instead of "patching" CoCo Max II, we rewrote it from scratch to take advantage of the CoCo Max III hardware. The results will knock your socks off! Below is a brief list of some of the *new* features, but some, such as **animation, color sequencing**, or the **slide show**, have to be seen. Send for the Demo Disk, and see for yourself.

**Everybody's favorite drawing package features:**
- A 50% larger editing window. - Zoom area **400%** larger. - New drawing tools: **rays, 3D cubes, arcs**,... - New editing tools: shadow, text size,... - Rotate by 1.5° steps - Select any 16 of the 64 possible colors (all 64 colors displayed at once!) - Powerful **color mix**: additive, subtractive, overlay,... - Full **color editing** of patterns and color changing patterns. - Incredible **special effects** with **color cycling** up to 8 colors with variable speed. -**Animation** adds the dimension of motion to your image. (Must be seen.) - Sophisticated data compression saves up to 70% of disk space when saving pictures.

In addition, there are dozens of enhancements to the multitude of features that made CoCo Max II a best seller.

### More about CoCo Max III

- CoCo Max III is not an upgrade of CoCo Max II. It is entirely rewritten to take advantage of the new CoCo 3 hardware (More memory, resolution, colors, speed,...)
- The new CoCo Max III **Hi-Res Interface** and the CoCo Max II **Hi-Res Pack** are *not* interchangable.
- The new interface plugs into the joystick connector.
- The CoCo Max III disk is not copy protected.
- CoCo Max III only works with the CoCo 3.
- A Y-Cable or Multi-pak is not necessary.
- Colors are printed in five shades of gray.
- CoCo Max III can read CoCo Max II pictures.

> *Note: CoCo Max II (for the CoCo 2) is still available on disk ($79.95). CoCo Max I is still available on tape ($69.95). For details, refer to our double page ad in any Rainbow from January '86 to July '87*

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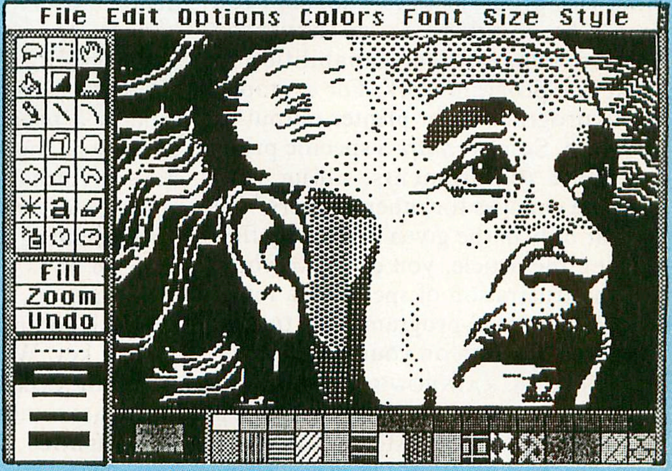

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Minimum system requirements are clearly marked at the top of the first page of each program's article, next to the tape/disk symbols. Before you begin typing in a program, be sure to check and see if the program will work on your computer system and how much memory the program requires. Make sure your machine has *at least* this much memory. Other things to verify are whether or not the program requires Extended Color BASIC (ECB) or Disk.

Finally, before typing anything in, read the article that accompanies the program. Make sure you understand what the program does and that you won't be required to do anything beyond your present capabilities to make the program work. For example, many programs offer printer output as a feature. Some *require* a specific printer. These requirements, along with possible changes for other printers, will appear only in the given article. By first reading the article, you can save yourself the frustration of spending a lot of time keying in a program only to find out it will not run on your system.

Typing in RAINBOW's programs is very simple. What you'll be typing in is called the program listing. To see an example, turn to Page 32 for the listing of the program *Urchin*. Next to "The listing" the word `URCHIN` appears in a strange type style. We call this type style "digital," and use it to indicate computer commands throughout the magazine. In this case, we use the digital font to denote a filename, the name the computer uses to refer to the program.

Programs are stored on disk or cassette as "files," and each file has a filename. Filenames are limited to eight characters. Often a program's name is longer than eight characters, like *Usetown Annex*, for example. The program's name contains 13 characters (the space counts, too), which is five too many. The problem is solved by shortening the filename to `USETOWN`.

If you are using a cassette-based system and have a blank computer tape for your cassette recorder, you are ready to begin typing in your program. But if you are using a disk-based system and plan to save your program to disk, you will first need to format one. Formatting, or initializing, as it's also called, prepares a blank disk to accept data from the computer system. (See William Barden's article, "Delving into the CoCo Disk," Page 180, which explains why formatting is necessary.)

### Formatting Your Disk

Before formatting a disk, however, make certain the disk you plan to use is blank, unless you want to delete or kill the programs stored on it — the formatting process erases everything on a disk. You can turn a "used" disk into a "new" blank disk by reformatting it, but remember, the formatting process "erases" the disk, and the programs on it will be lost. Also, don't attempt to format a disk with write-protect notches that have been taped over — it won't work; you'll get a WP Error. Such a disk is called a "write-protected" disk, and the notches are taped to prevent accidental erasure. A final word of caution is necessary here. The process of formatting a disk will *erase all contents from the computer's memory*! Don't type in a program and then format a disk for saving it. Always make sure you have a formatted disk with plenty of space *before* you start typing.

Formatting a disk is simple. All you have to do is put the disk in the drive, label-side up, close the drive gate, and type this command: `DSKINI0`. Press the ENTER key. What the command means is that the disk in Drive 0 (the only drive, if you have only one) is being initialized, or formatted, for your computer system. Don't worry if you hear strange whirs and clicks coming from your drive — it's normal.

If you have a double, or dual, disk drive, you can format a disk in either drive. As you formatted the disk in Drive 0 with the BASIC `DSKINI0` command, you can format a disk in Drive 1 (the second drive) with the `DSKINI1` command. Don't be confused by the second drive being called Drive 1; just remember that the first drive is always Drive 0. In a horizontal drive, Drive 0 is on the bottom and Drive 1 is on the top. Insert your disk with the label facing up. In a vertical drive, the disk slots run up and down; Drive 0 is the one on the left, and Drive 1 is the one on the right. Insert your disk with the label facing to the right.

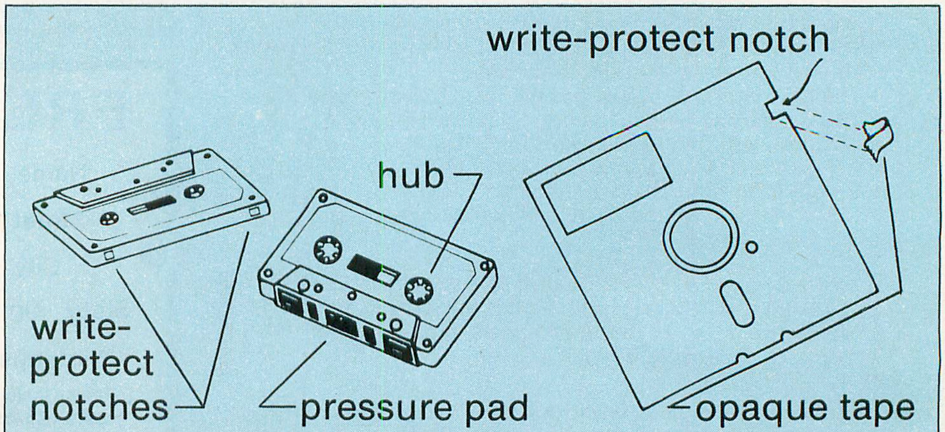
You need format a disk only once, and then you can store as many programs on it as it will hold. After you have formatted a disk, you are ready to begin typing in a program.

### Typing In Programs

You can use the following instructions for typing in `URCHIN` or any other program listing in THE RAINBOW. Perhaps you should start with one of the program listings in "Novices Niche" (beginning on Page 72) for your first project, as they can be entered in a matter of minutes. But for examples we'll use *Urchin*, because it's a feature program.

We realize the listings may look a little intimidating, especially to beginners, but we've made keying them in as easy as possible. One of the things we've done is print the listings on the page exactly as they should appear on the screen, in 32 columns. (If you've noticed, your screen is 32 columns wide, which means it can hold only 32 letters, numbers or spaces on one line.) Also, to help you in debugging your typing errors, we have a program that checks your typing for accuracy — the *Rainbow Check PLUS* program, but we'll get to that later.

Looking at the listing `URCHIN`, for example, you'll notice that each line



**The figures above indicate the location of the write-protect notches on a cassette tape and a floppy disk. To write-protect a cassette, use a screwdriver to knock out the plastic tab on the *left* of the side of the tape you are using. If you want to reuse that side, cover the hole with a small piece of cellophane tape. The disk works the opposite way — as long as the notch is uncovered, the disk can be written to. If, however, you cover the notch with opaque (non-transparent) tape, the disk cannot be written to.**

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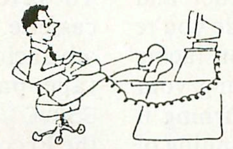

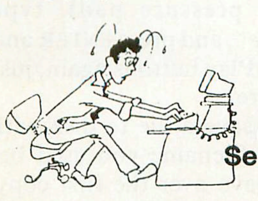

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begins with a number. The first line reads: `10 GOTO 460`. This is Line 10: The number on the left is the line number. A line number can be used only once — there can be only one Line 10. The next line is Line 20, then 30 and 40, etc. Line numbers don't have to follow each other in multiples of 10 (that decision is made by the programmer), but they do have to follow in numerical order (i.e., Line 40 always comes before 50).

Notice that lines 10 and 20 are very short, taking up less than one row of space, while Line 90 takes up nearly five rows of space. The length of lines can vary from less than one row of screen space (up to 32 characters) to almost eight rows (248 characters). No more than *248* characters can be *directly* typed into one line.

It's helpful to be able to determine the line numbers when typing in the listing, but sometimes it is difficult to distinguish them from other numbers inside the line, especially when lines take up more than one row of screen space. If you're like me, you probably thought, at first glance, that the line number following Line 410 was Line 66. But Line 66 does not exist in this program; the `66` is part of Line 410. As a guide, remember that line numbers follow each other numerically and that there is usually some sort of pattern or order in the way program lines are numbered, such as a progression of lines by 10.

OK! Now it's almost time to get your fingers wet! But before you begin, you first must get rid of whatever is currently in the computer's memory in order to make room for the program you are about to type in.

*Note: If you are using a disk system and have a disk in the drive, be sure to take it out of the drive before turning the drive or the computer off or on, as program data can be zapped from the disk. Also — and this is very important — never plug in or remove a program pack or disk controller while the computer is on, as it could damage the computer.*

If you have just turned on your computer, there is nothing in memory to get rid of, and you are ready to begin. However, if you have been noodling around, reset the computer by turning it off, waiting 15 seconds, and then turning it on again. This is called a cold start. Type `NEW` for good measure (this tells CoCo you are starting something new).

### Getting Your Fingers Wet

Now type the first line of the program, making sure you type in each character and space exactly as it appears on the page. If you make a mistake, you can correct it by backing up using the left arrow key or simply retyping the line again. If you are keying in `URCHIN`, type `10 GOTO 460`. When you reach the end of the line, press the ENTER key. You must always press ENTER for the computer to take any notice of your efforts when typing in a line. Whenever you are told to "enter" a command, type it and press the ENTER key.

Notice that your listing flows from one row to the next without your having to press ENTER. Even though a line may be eight rows long, press ENTER *only* at the very end.

Continue entering lines exactly as they appear, pressing ENTER after each, until you reach the end of the program or until you get tired of typing, whichever comes first. You don't have to type in an entire program in one sitting — you can save what you have done and resume entering later.

### Saving Your Program

When you have finished typing the entire listing or have reached a stopping place in the middle, you are ready to save the program. Even if you have typed in only the first few lines of a program listing, it is important to save it. If you were to turn off the computer without doing so, you'd have to enter it all again! And that, my fellow novice, is a bummer. I know. Also, don't be tempted to run your program before saving it to tape or disk — the computer could lock up and you would have to start over.

To save a program on cassette, first set the recorder's volume level to 3 (the most commonly used setting for saving and loading) and make sure the tape is blank — you don't want to save over a program you intend to keep. Then rewind the tape, reset the counter number on the cassette recorder and remove the cassette with the side you're about to save your program on facing up. Advance the tape by putting your finger in the right hub and turning it counterclockwise until the beginning of the brown part of the tape goes slightly past the pressure pad (see Figure 1).

Put the tape back in the recorder. Now you are ready to save your program. Type `CSAVE"`*filename*`"` (simply enclose in quotes the name of the file you are saving), press ENTER, and then press the Play and Record buttons on the cassette recorder. Sticking with our earlier example, we would enter `CSAVE"URCHIN"`. The `C` in the command stands for "cassette." When CoCo has finished the saving process, it will print "OK" on the screen, and the tape will stop winding. Turn off the cassette recorder (press the Stop button) to prevent the tape from stretching.

To save your program to disk, type `SAVE"`*filename*`"` and press ENTER. Your drive will whir as the file is being saved. When CoCo has finished saving the file, the message "OK" will be displayed. If you are conscientious and would like to verify the save, type `DIR` and press ENTER. `DIR` is the command for the disk directory, which should by now have popped up on the screen. If the file you just saved is the first thing you saved to the disk, its filename will be the only one you see (along with some other information). However, if formatting and saving are old hat to you, and you have previously stored other programs on the disk, you will see a whole list of filenames.

### Backing Up Your Program

Diamonds are forever, but disks aren't, and tapes are even more short-lived. Sooner or later, your precious data will be zapped, or entropy will take over. To prevent catastrophes, make several copies of your program and periodically back them up. A simple way to do this is to save the program one more time, particularly on a different tape or disk.

To make a backup of a program on the same cassette or to save another program immediately following the first program on a cassette, press the Record and Play buttons, then type `MOTORON`, wait approximately five seconds and press any key followed by ENTER (to stop the `MOTORON` command). This is done to put blank space between two programs on a cassette, and to avoid getting I/O Errors when loading. This process of separating programs must be repeated between every cassette save. To save your program to another cassette, simply prepare it for saving (by advancing the transparent leader of the tape past the pressure pad), type `CSAVE"`*filename*`"`, and press ENTER and the Record and Play buttons again, just as you did before.

If you try to save a file to disk with the exact same filename you used before, you will save over the first copy. To make backup copies of a program on the same disk, save the file under a different filename. For example, you might call a backup of the `URCHIN` listing `URCHIN1`. Remember not to let your filenames exceed eight characters!

It is possible to save a file using the

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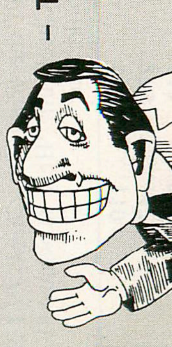

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same filename by changing the extension, which is the invisible part of a filename used when loading or saving a file. If you have a disk system, call up the directory using the command `DIR`. If you have saved `URCHIN`, here is what you will see:

```
URCHIN BAS 0 B 1
```

The filename in the first column is followed by `.BAS`, which denotes a BASIC file, and is the extension you saved `URCHIN` under, by default. When you don't give a BASIC file an extension, CoCo assigns one for you — `.BAS`. But an extension can be any combination of three other characters, or just one or two characters.

To save `URCHIN` again under the same name, but using a different extension, type `SAVE"URCHIN.ABC"`. We have changed the extension from the default, `.BAS`, to `.ABC`. Now you have two copies of `URCHIN`. You can make several more backups, if you wish. Many CoCoists use the extension `.BKU`, to indicate that the program is a backup.

Also, it is a good idea to make several saves of a program while you are working on it. If a huge power surge or a brownout comes along, you will lose all your work since the last save. In writing this article, I lost half an hour's work in my word processing file because of a one-second power surge. Retyping something you thought you had nailed down is not fun. So, please, please, make frequent saves! Cray Augsburg says he saves his programs to disk after every 10 lines.

After you have saved your program to disk, remove the disk from the drive and reset the computer by turning it off, waiting 15 seconds and then turning it on again. Enter `LIST` to call up `URCHIN`'s listing. Uh oh, nothing happens! `URCHIN`'s file has disappeared from memory. Don't panic; we can call it back. Aren't you glad you saved your program?

**Loading Your Program**

From disk, the procedure you will use when loading any BASIC program saved with the default extension `.BAS` is to type `LOAD"`*filename*`"` or `LOAD"`*filename*` .BAS"` and press ENTER. It is not necessary to type the extension, although `.BAS` will be accepted. If a program is saved with a different extension, however, the extension *must* be included within the command. For example, if the filename is `URCHIN` and the extension is `.BKU`, you must type `LOAD "URCHIN.BKU"` to load the file from disk. If you were to simply type `LOAD"URCHIN"`, the computer would search for the extension `.BAS`.

From cassette, the procedure to use when loading a BASIC program is to first rewind the tape to find the counter number you noted earlier (which marks the beginning of the program on tape), and then type `CLOAD"`*filename*`"` and press ENTER and the Play button on the recorder. As the computer *searches* for the given filename on the tape, you will notice the letter S appears in the upper-left corner of the screen. When the computer *finds* the file in question, the S will change to an F. The F will alternate between normal and inverse video as the specified file is loaded.

After you have loaded a file and the computer responds with the "OK" prompt, you are ready to list or run the program. Enter `LIST`. Ta da! `URCHIN` is back. The `LIST` command scrolls through the listing until it reaches the last line. If you need to resume keying in the listing, this is where you pick up.

**Debugging Your Program**

When typing in an entire listing, it is most likely that you will make several mistakes. The most direct method of finding out if your program is correct is by giving it the "Run" test: Type `RUN` and press ENTER. If the program runs flawlessly, crown yourself the universe's supreme typist. But, if you're like me, your program will probably start fabulously — only to stop with an error message.

What you have to do is go back and match each line of the listing on the page against each line you see on the screen. To do so, type `LIST` followed by the first line number you want to check. For example, type `LIST10` to check `URCHIN`'s first line. Just one colon, comma or period out of place is enough to make the program crash.

How do you fix your mistakes once you find them? The Extended BASIC `EDIT` command invokes a line editor for making changes to your programs. To use it, type `EDIT`*xxx*, where *xxx* is the line number of the line you want to edit. Now, after pressing ENTER, you will see a copy of the complete line printed on the screen just as you typed it. Just below that, you will find the cursor flashing after the specified line number. You are now in the Edit mode. You can advance through the existing line by pressing the space bar, or backspace with the left arrow key (your character will be erased from the screen, but not from memory).

You can delete characters using the D key. Simply advance your cursor, using the space bar, so that the last character you want to keep is just to the left of the cursor. Pressing the D key now will delete the next "invisible" character. Press D for as many subsequent characters as you want to delete. For example, if you want to delete the word `PRINT` because you unintentionally typed it twice, simply press the D key five times. However, if you want to erase everything from the cursor to the end of the line, press H, which stands for "hack." If you want to enter more characters at this point, just start typing. Using the hack command automatically puts you into the "insert" mode.

To enter the insert mode otherwise, position your cursor again by using the space bar. When ready, press I. You can now enter any additional characters you might want. *Caution: The left arrow key does erase when in the insert mode.* To leave the insert mode, just hold the SHIFT key down and press the up arrow key one time. Press ENTER. The edited lines will now replace the original in the CoCo's memory. When you've finished debugging, be sure to save the corrected program to tape or disk. For more detailed information about the `EDIT` command, consult the manual that accompanied your CoCo.

RAINBOW has another method of helping you debug your typing — the *Rainbow Check PLUS* program. See "Rainbow Info" on Page 10 for more explicit directions, but, in a nutshell, here is how the *Rainbow Check* program works: It calculates a "checksum" value based on the characters that appear in a given segment of the program, and it shows this number to you. You can then compare the number with the one we calculated and printed in the *Rainbow Check PLUS* box that appears at the beginning of program listings. This is a big help, because it allows you to debug your program in sections. The only drawback is that you get only one chance to debug using *Rainbow Check PLUS* while typing a program in. Once you have gone past one of the checksum line numbers, you cannot go back and use the *Check PLUS* program to compute a checksum for that line number.

We call the *Rainbow Check PLUS* chart a Checksum. Here is what `URCHIN`'s looks like:

| | |
|---|---|
| **130** | **110** |
| **275** | **47** |
| **410** | **201** |
| **END** | **18** |

The numbers on the left are actual

line numbers within the program; the numbers on the right are the results of calculations the *Rainbow Check* program performs.

To use the *Rainbow Check PLUS* program, key in and save its listing from "Rainbow Info" on Page 10. Type `RUN` and press `ENTER`. Then enter the command `NEW`, and you are ready to start typing in a program. Start typing! When you have finished typing the listing through the entire line indicated by the first line number in the chart (Line 130, in the case of `URCHIN`), press `ENTER`, as you would normally, then press the down arrow key. CoCo then gives you the checksum value. This figure should match the one given in the chart, 110. If it doesn't, you need to go back and debug the program from its beginning to Line 130.

The next line number on the chart is 275. When you have typed in `URCHIN` up to the end of that line, stop and repeat the process. If your result doesn't equal 47, then, again, you made a mistake. Fortunately, you don't have to go back to the beginning of the program to find your error, only back to the line following your last Rainbow Check, Line 140.

Now that you know the basics of operating your CoCo on a day-to-day basis (formatting, saving, loading, listing, debugging and running), it's time for the fun stuff!

# HINTS, TIPS, PEEKS & POKES

**Cassette Input/Output**

If you suspect the file you are looking for is somewhere in the middle of a tape, and you don't want to wait as CoCo passes over all the programs from the beginning of the tape to where your program starts, you can use the command `AUDIOON:MOTORON` to help you get there faster. Enter the command, and when CoCo says "OK," fast-forward or rewind your tape to the approximate location of the file. Do not type `CLOAD`, just press the Play button.

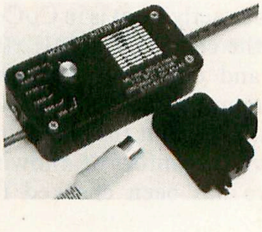
Surprised? Where a program is recorded on tape, you hear a high-pitched whine. A place of silence indicates where the tape is blank, between programs. When you have found a few seconds of silence, quickly stop the tape (by pressing any key and `ENTER`), enter `CLOAD`, and press Play. CoCo will load the next program it comes to.

However, if you try to do a `CLOAD` in the middle of a program (where there is noise), the computer will stop with an I/O Error. Make sure you start the loading process where the tape is silent. (See last month's "Novices Niche" for Bohdan Hrycaj's *Call*, a cassette utility that eliminates the need for using `AUDIOON:MOTORON`.) For fun, sometime, use `AUDIOON:MOTORON` with one of your music tapes to see what the music sounds like coming through your computer's speaker.

**Magnetic Mayhem**

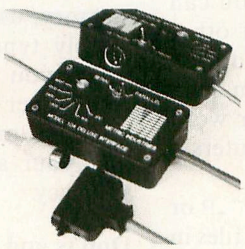
Disks and cassettes are delicate creatures; their innards are laced with magnetic patterns, so don't let them near a magnet! Also, keep cassettes, disks, cassette recorders and disk drives away from the left side of the TV, or at least a half a foot away, because the flyback transformer is located there: It puts out a lot of interference and can make your computing life a sea of I/O Errors.

**Model 101 Interface $39.95**



- Serial to parallel interface
- Works with any COCO
- Compatible with "Centronics" parallel input printers
- 6 switch selectable baud rates 300-600-1200-2400-4800-9600
- Small size 4.5" x 2.5" x 1.25"
- Comes complete with cables to connect to your computer and printer

**Model 104 Deluxe Interface $51.95**



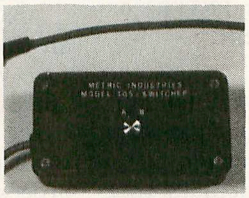
Same features as 101 plus

- Built in serial port for your modem or other serial device
- Switch between parallel output and serial output
- Size is 4.5" x 2.5" x 1.25"
- Comes complete with cables to connect to your computer and printer

**Model 102 Switcher $35.95**

- Connect to your COCO serial port and have 3 switch selectable serial ports
- Color coded indicator lights show switch position
- Lights also serve as a *power on* indicator for your COCO
- Heavy guage blue anodized aluminum cabinet with non-slip rubber feet

**Model 105 Switcher $14.95**



- Connects to your COCO to give you 2 switch selectable serial ports
- 3 foot cable to connect to your COCO's serial port
- The perfect item to use to connect a printer and a modem to your COCO
- Small in size, only 4.5 x 2.5 x 1.25

**Cassette Label Program $6.95**

- New Version - tape transferrable to disk - save and load labels from tape to disk
- Prints 5 lines of information on pin-feed cassette labels
- Menu driven, easy to use
- Standard, expanded and condensed characters
- Each line of text automatically centered.
- Label display on CRT, enabling editing before printing
- Program comes on tape and is supplied with 24 labels to get you started
- 16K ECB required

**Other Quality Items**

High quality 5 screw shell C-10 cassette tapes. **$7.50/dozen**

Hard plastic storage boxes for cassette tapes. **$2.50/dozen**

Pin-Feed Cassette Labels
White **$3.00/100**
Colors **$3.60/100** (specify red, blue, yellow, tan)

**NEW! Cables for your COCO**

- U.L. listed foil-shielded cable
- 2 Types: male/female extension cables (used between a serial device and existing cable) male/male cables (used between two serial devices such as a modem and one of our switchers).
- 3 ft./$3.95, 6 ft./$4.49, 10 ft./$5.59 Specify M/M or M/F and length.

The 101 and 104 require power to operate. Most printers can supply power to your interface. (Star, Radio Shack and Okidata are just a few that do - Epson and Seikosha do not). The interfaces can also be powered by an AC adaptor; Radio Shack model 273-1431 plugs into all models. If you require a power supply, add a "P" to the model number and add $5.00 to the price. (Model 101P $44.95, Model 104P $56.95).

The Model 101, 102, 104 and 105 work with any COCO, any level basic and any memory size. These products are covered by a **1 year warranty.**

The Model 101 and 104 work with any standard parallel input printer including Gemini, Epson, Radio Shack, Okidata, C. Ioth, Seikosha, Panasonic and many others. They support BASIC print commands, word processors and graphic commands.

**We manufacture these products - dealer inquiries are invited.**

**Ordering Information**

Free shipping in the United States (except Alaska and Hawaii) on all orders over $50.00. Please add $2.50 for shipping and handling on orders under $50.00.
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If you prefer, send check or money order; payable in U.S. Funds to:

**Metric Industries**
**P.O. Box 42396**
**Cincinnati, Ohio**
**45242**

### Resetting the computer

When you have finished with one program and want to load another, you can press the BREAK key or the reset button and the computer allows you to load another program into memory and run it. However, the program you were working with previously is still wandering around in memory. If you load a lot of programs this way, strange things can occur because of the "remnants" of the previous programs. To be safe, you need to turn your computer off for 15 seconds and then on again to completely clear the memory (remember the cold start?).

But frequently turning off and on your computer is not good for it. A solution is to enter `POKE113,0` and press the reset button. This accomplishes a cold start, as if we had turned the computer off and on.

For those of us who would rather wiggle our fingers than exert ourselves to reach around the machine for the reset button, simply type and enter `POKE113,0:EXEC40999`. This poke gets a lot of use here at THE RAINBOW.

### PCLEAR1 Bug On CoCo 1

Whenever CoCo 1 encounters a `PCLEAR1` statement, a bug in its system prevents the program from running. When you try to run, you get an SN Error referencing the line containing the statement. The solution is simple — just type `RUN` again and press ENTER, or delete the `PCLEAR1` statement.

### Directory Printouts

Entering `POKE111,254:DIR` will print out your disk directory if a printer is hooked up.

Works on CoCo3 for BASIC Pgms (not on PROFILE, etc.).

The CoCo printer port defaults to a rate of 600 baud. If your printer uses a different baud rate, you can change the CoCo's baud rate with a simple poke. To change the baud rate to 1200, enter `POKE150,41`. Many Radio Shack printers are capable of running at 1200 baud. Some can even handle 2400 baud. To change CoCo for this value, enter `POKE150,18`. If you own a serial to parallel converter for your CoCo and printer, it probably works at 9600 baud. Just use `POKE150,1`. To change the CoCo back to 600 baud, use `POKE150,87`.

### Automatic Lowercase

When your computer is in the command mode (when not under the direction of a program), you can toggle back and forth between uppercase and lowercase by pressing SHIFT-0. Or you can enter `POKE 282,0` to move into lowercase and `POKE 282,1` to return to uppercase. You can use these pokes directly, or within a program. Remember, though, that CoCo 1 and some CoCo 2s do not have true lowercase capability in the 32-column mode. What you see on the screen will be an inverse copy of the appropriate uppercase character. However, the machine will recognize the character's true lowercase value internally.

### Accidentally Pressing BREAK

If you accidentally press the BREAK key, all is not lost. Enter `CONT` and you will be returned to where you left off.

### The Speed-Up Poke

Entering `POKE 65495,0` allows you to double the computing speed of the newer CoCo 1s and 2s. You can use the poke as a direct command or in a program. Older CoCos cannot handle it, however; so, if a program locks up or freezes on you, look for occurrences of this poke and delete them from the program listings. To slow down the speed-up poke, enter `POKE 65494,0`. The CoCo 3 speed-up poke is `POKE 65497,0`. The "slow-down" counterpart is `POKE 65496,0`. Also, don't try to save or load programs from tape or disk while in the high-speed mode! Always slow the system down before performing any tape or disk operations.

### Saving in ASCII

ASCII is sort of the universal standard for the computing world. You can save your files in a format that other computers, like the Tandy PC and IBM Compatibles, can read. You can read word processing files from other word processors and from other computers if the saves are done in ASCII.

Use the format `SAVE`*"filename"*`,A` or `CSAVE`*"filename"*`,A` to save your files in ASCII.

### Editing in ASCII

Wouldn't it be great to be able to edit your programs as you edit documents with a word processor? Well, you can! But first you have to save a copy of your program in ASCII format (see above). Merely load the program as you would any other document into your word processor, and you are ready to race all over the screen with your cursor, inserting and deleting at will.

### Disk Backups

It is a good idea to back up, or make copies of, your programs. The `BACKUP` command copies the whole side of a disk to another formatted disk, and `COPY` copies just one file. To use `BACKUP` with a single-drive system, enter `BACKUP0` and follow the prompts in switching your source and destination disks. For a dual-drive system, type `BACKUP0TO1` or `BACKUP1TO0`; the first number is the drive number of the drive holding your source or master disk. The second number is that of the drive holding the formatted destination disk, the one that will become your backup. (The commands are essentially the same, but `BACKUP1TO0` is a little safer, because it places the destination disk in the default drive. If your master is in Drive 1, it shouldn't be written to by mistake.)

### Verifying Cassette Saves

Cassette saves are not as reliable as disk saves — ordinary cassettes are often used instead of special computer ones, and the tape is prone to wear, tear and stretching. It is best to make multiple saves of your program and then verify that they have been saved correctly. To verify tape saves, rewind the tape to the beginning and enter `SKIPF`*"x"*, where *x* is the last filename saved on the cassette, then press the Play button. If the saves are OK, your tape will wind uneventfully to the end. The `SKIPF` command will stop with an I/O Error if there were any recording errors.

### Verifying Disk Saves

To make sure that what is written to a disk matches exactly what is in CoCo's memory, use the command `VERIFYON`. Merely type and enter the command before you attempt a save. Saving will take longer this way, but the extra time spent is worth the comfort of knowing that your save has been checked for accuracy.

### Don'ts and Don'ts

Finally, to reiterate something you already know, never plug in or remove a pack from your computer when it is turned on, as you will damage the computer. And never turn your computer off or on when there is a disk in the drive, as you stand to lose your data. If you do either, you're asking for a zap.

Welcome to the world of CoCoing! I hope this material has been helpful and will get you started on the right foot. Check out Lee Veal's dictionary of computer terms on Page 85 for additional assistance. Finally and foremost, read and reread the manual supplied with your Color Computer, and keep following THE RAINBOW!

*A fast, fun game with a really bizarre scenario*

# The Urchins from the Black Lagoon

### By Eric W. Tilenius

To tell you the truth, I'm rather embarrassed by this game. No, not because *Urchin* is a bad game, or because it's slow, or any other reason like that. In fact, it's a great little game, and even the slowest of typists should be able to get it keyed in and running within half an hour. You won't spend hours and hours typing it in, and it has speed, adjustable skill levels, color, machine language screen scroll, and lots more!

**What's So Embarrassing?**

Well, I usually pride myself on my imaginative story lines. This being the case, I just couldn't write another "aliens are invading Earth" story for this game. So I tried to think of a scenario that hadn't been used before.

That's when I came up with this embarrassing scenario, which (I think) has never been used before (and hopefully will never be used again!). Ready for it? Well, here goes. . . .

---

*Eric Tilenius is a Huntington Station, New York resident, whose parents and girlfriend think he spends entirely too much time with his CoCo. However, Eric claims this is a ridiculous and biased account. Incidentally, he has never personally been attacked by a sea urchin.*

Once upon a time, there were 26 letters of the alphabet that lived in a little red schoolhouse. Every day the teacher would put these letters on a polka-dotted blackboard so that all the students could gape and goggle at them. As far as the letters were concerned, that was all very well and good. But at night, it was a different story! Every night, when the teacher left the building, giant sea urchins would break in through the window and pounce on the unsuspecting letters.

That was not good at all. Just imagine, there they were — "Mr. A" (or "Mr. B" or "Mr. T") — sitting quietly on their blackboard when *whoosh*! *smash*! they're squashed by a gigantic urchin. How undignified! To save themselves from this humiliation, the letters issued an interplanetary distress call. Guess who comes to their aid? Why, you, of course. (The worst is still to come).

You are an extraterrestrial blackboard eraser, and it is your job to erase the blackboard. Unfortunately, you haven't been cleaned in months, so when you move, a trail of yellow chalk is left behind. Your mission is to erase all the letters before the urchins get them. Of course, you have the standard problem of any extraterrestrial blackboard-letter-eraser: You can't run into your chalk trail. In addition, you can't run into an urchin, as they love to squash erasers, as well as letters.

Now do you see why *Urchin* is so embarrassing? Blackboard erasers, sea urchins, alphabet letters — what a cast! Nonetheless, it's a neat little game. One of the best features is the way the whole screen scrolls as you move. I would like to thank T&D Subscription Software for these routines.

**Game Play**

To play *Urchin*, you need 16K Extended Color BASIC. The game works on either disk or cassette systems, and requires no special loading instructions.

Before typing in *Urchin*, turn your computer off, wait a few seconds, then turn it on again. Next, type in the program listing and save it to disk or cassette by typing `SAVE"URCHIN"` or `CSAVE"URCHIN"`, respectively. Then run the program. If you mistype any of the `DATA` statements, the computer will display an error, so be very careful when typing these in.

When you run the program, you are asked for a skill level from 1 to 9. Skill Level 1 is very slow and easy, while Level 9 is fast and extremely hard. I'd suggest starting with Level 4.

When you select a skill level, the screen clears and the blackboard appears, followed by the 26 letters of the alphabet. After a one-second pause, the computer beeps. You will then see a

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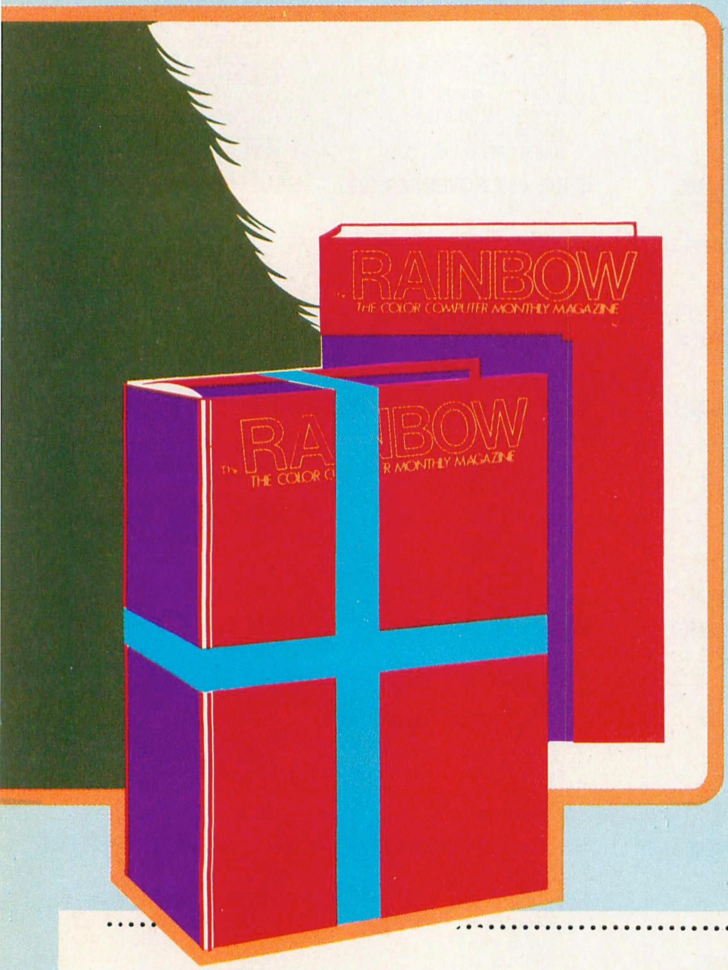
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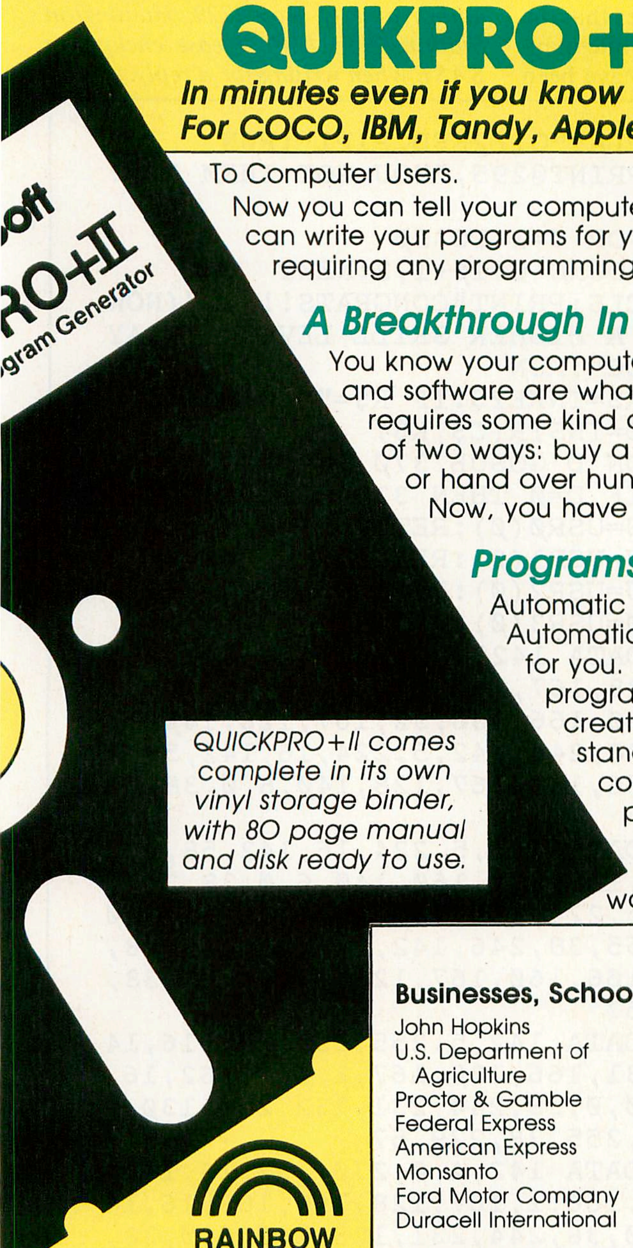

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flashing square in the center of the screen — that's you. Quickly tap one of the four arrow keys to indicate the direction you would like to go (if you aren't quick, the game will end).

Purple urchins start appearing on the screen. Try to run over all the letters by using the four arrow keys, without doubling back on yourself or hitting an urchin. When you go over a letter, you will hear a slight beep, which means you just scored another point.

So hop to it! Stop making fun of the scenario and start typing in *Urchin*. You'll love it!

**Warning:** The author advises that the player not eat "Alpha-bits" while playing *Urchin*, as some players have been known to become confused, ending up erasing their cereal and eating their TV sets. If this happens, unplug the TV immediately.

*(Questions may be directed to the author at P.O. Box 1729, Huntington Station, NY 11746. Please enclose an SASE when writing for a reply.)* ☐

```
130 ......110
275 .......47
410 ......201
END ......18
```

**The listing:** URCHIN

```
10 GOTO 460
20 CLS0:SS=0:EC=175
30 IF CO=128 THEN SC=1 ELSE SC=6
5
40 FOR C=1024 TO 1535:POKE C,CO:
NEXT
50 FOR C=SC TO SC+25
60 PO=RND(512)+1023
70 IF PEEK(PO)=CO THEN POKE PO,C
:NEXT ELSE 60
80 C$=CHR$(10)+CHR$(94)+CHR$(8)+
CHR$(9)
90 FORI=14000 TO 14151:READD:POK
EI,D:TM=TM+D:NEXT:IF TM<>16384 T
HEN SOUND 1,10:CLS:PRINT"*DATA E
NTRY ERROR*":PRINT"RECHECK DATA
STATEMENTS.":END
100 DEFUSR0=14000:DEFUSR1=14046
110 DEFUSR2=14092:DEFUSR3=14123
120 SOUND 1,1:K$=INKEY$
130 IF PEEK(1264)=EC THEN 230
140 IF PEEK(1264)=159 AND TURNS>
5 THEN 230
150 IF PEEK(1264)<91 AND PEEK(12
64)>64 THEN SOUND 87,1:SS=SS+1
160 POKE 1264,191
170 FOR C=1 TO P:NEXT
180 POKE 1264,159
190 TURNS=TURNS+1
200 IF RND(11-S)=2 THEN POKE RND
(100)+1024,EC
210 IF SS=26 THEN 290
220 GOTO 330
230 FOR C=0 TO 8
240 POKE 1264,128+16*C-1
250 PLAY"O3L50CDEDC"
260 NEXT:CLS
270 PRINT"OOPS... BAD MOVE!",,,"
YOU SCORED:";SS:PRINT"ON SKILL L
EVEL:";S:PRINT:PRINT"**TOTAL POI
NTS**":PRINT"    ";S+SS
275 PRINT:PRINT"MAYBE NEXT TIME
YOU'LL GET THEM ALL... (KEEP TRY
ING!)"
280 PLAY"O1L2EEDCP1P1":RUN
290 PRINT@295,"YOU GOT THEM ALL!
"
300 FOR C=1 TO 20
310 SOUND C*10+1,2:NEXT
320 CLS:PRINT"CONGRATS!!",,"(NOW
 TRY A HIGHER SKILL LEVEL)":PLAY
"CDEDC":RUN
330 K$=INKEY$:IF K$=""GOTO350
340 D=INSTR(C$,K$)
350 ON D GOSUB 370,380,390,400
360 IF D=0 THEN 330 ELSE 130
370 U=USR0(0):RETURN
380 U=USR1(0):RETURN
390 U=USR2(0):RETURN
400 U=USR3(0):RETURN
410 DATA 142,4,0,16,142,58,152,1
66,128,167,160,140,4,32,38,247,1
42,4,0,166,136,32,167,128,140,5,
224,38,246,142,5,224,16,142,58,1
52,166,160,167,128,140,6,0,38,24
7,57
420 DATA 142,5,224,16,142,58,152
,166,128,167,160,140,6,0,38,247,
142,5,224,166,130,167,136,32,140
,3,255,38,246,142,4,0,16,142,58,
152,166,160,167,128,140,4,32,38,
247,57
430 DATA 142,5,255,230,132,16,14
2,0,31,166,130,167,1,166,162,16,
140,0,0,38,244,231,132,230,130,1
40,3,255,38,229,57
440 DATA 142,4,0,230,132,16,142,
0,31,166,1,167,128,166,162,16,14
0,0,0,38,244,231,128,140,6,0,38,
231,57
450 END
460 PCLEAR1
470 CLS
480 PRINT">>URCHIN... A 'NO FRIL
LS' GAME<<        BY ERIC W. TILEN
IUS."
490 PRINT:PRINT"*USE THE ARROW K
EYS TO SAVE THE**LETTERS FROM DE
STRUCTION!!!!!!* "
500 INPUT"SKILL LEVEL (1-9)";S
510 IF S<1 OR S>9 THEN 470 ELSE
P=200/S-20
520 CO=180
530 GOTO 20
```

# BASIC for Beginners

## Lesson II

### By David W. Ostler

In a previous article [September 1987, Page 26], I covered variables and some of their uses in programming. This time I will cover more of the most used commands that will help you become good programmers.

Remember the old saying "Practice makes perfect"? It is even more true in programming. If you know about a command and do not practice it, you will probably forget about the command when it's needed most. Therefore, try all of these commands at least 10 times, to entrench them in your mind. Also, remember this series just covers some of the commands found in the Color Computer BASIC language, not the commands pertaining to drawing and graphics generation. Many programmers do not program for graphics, so I concentrated on the commands common to many of the different BASIC languages.

My son is able to translate programs for the Apple and Commodore computers for use in his school work. Many of the commands translate directly, with few exceptions.

**REM (')**

The apostrophe (') or `REM` symbol is the famous remark statement. It notifies the computer that all characters following the symbol are not commands and should be ignored by the computer's command interpreter.

Use `REM` statements to place remarks within the program body itself to embed programming notes that explain the use or function of particular portions of a program. This helps when trying to debug a program, which is the act of finding the location of a problem (called a bug) that has made itself known by returning a wrong answer or causing the

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program to crash. It also allows a programmer to know where various parts of the program are stored within the body of the program. This is helpful when you have various loops within a program.

This practice is useful for beginners and for expert programmers who are working with a very intricate program.

Some programmers prefer to use the `REM` statement instead of the apostrophe symbol. The proper syntax for this command is `10 GOTO 5 'THIS LOOP STARTS THE PROGRAM OVER`. The computer recognizes only the `GOTO 5` command and ignores the rest of the line.

Remember that any character you place in a program will use up memory, whether it's a command or remark and text. So, use remarks only where you need them, but *use* them!

### CLEAR

The `CLEAR` command notifies the command structure that you want to set up an area of memory reserved for variable storage. It is normally used as `CLEAR` *xxxx*, where *xxxx* is the amount of memory you want to reserve. Or it can be used as `CLEAR` *xxxx*, *yyyy*, where *xxxx* is still the amount of memory you want to reserve, but *yyyy* is an area of memory you desire to protect from overwriting. The *yyyy* area is usually used to protect the BASIC memory area from any variable storage.

The *xxxx* figure is usually obtained by trial and error, until a satisfactory balance between variable storage and program area is reached.

Also, when you clear memory within the body of a program, all variables are cleared out. All numeric variables will now equal zero, and all string variables will have nothing in them after a `CLEAR` command is issued. Therefore, it is normal practice to issue a `CLEAR` command early in a program, unless you want to clear out all variables at a certain point in a program.

### PRINT@

The `PRINT@` command makes a program appear professional. It orders the computer to print text or graphics characters to the screen at the location desired. For the screen locations that are available, see your manual for the `PRINT@` worksheet page.

Proper syntax is `PRINT@` *xxx*,, where *xxx* is a numerical value between 0 and 511. This numerical value directly relates to the screen location as found in the `PRINT@` worksheet. The command is usually used as `10 PRINT@ 128,"THIS TEXT WILL BE PRINTED"`.

This would have been printed at screen location 128, and the text would have ended at screen location 152. Another enhancement of the `PRINT@` command is to use it with the `CLS` command and to use the semicolon delimiter. Try this line and see what result it has:

```
10 CLS3:PRINT@ 227, "THIS
TEXT WILL BE PRINTED";
```

The screen would be blue with normal text starting at screen location 227 and ending at screen location 251. The only difference between this line and the other one above is that the screen is blue with the text centered within the blue screen. Notice that blue is showing even after the last character of text is printed. Take out the semicolon and see what effect it has on how the line is printed.

Here are tips that will help you center text on a line:

1) Count the number of characters you want printed on the line. (Remember, a line can be no longer than 32 characters.)
2) Subtract that number from 32.
3) Take the remainder from Step 2 and divide by 2.
4) Add the amount obtained in Step 3 to whatever screen location line you want to print that text.

### STRING$

The `STRING$` command is used to create a 1 to 255 character string made up of the same character. This is useful when trying to create a title page, border, etc., to enhance a program's appearance.

Proper syntax for this command is `STRING$(`*xx*`,`*yy*`)`, where *xx* is the character desired. This character may be any of the ASCII characters, any of the graphics characters your computer can generate for screen use, or any characters your computer can send to various output devices, such as disk drives, printers, tape drives and modems. The *yy* value is the number of characters that you want to create.

### SOUND

The `SOUND` command produces a tone from the speaker of the television or monitor. It can be used to notify you when input is needed or an error has been detected or made.

The proper syntax for this command is `SOUND` *x*,*y*, where *x* is a number between 1 and 255 and sets the pitch of the tone. *Y* is a number between 1 and 255 and sets the length of the tone.

### GOSUB

The `GOSUB` command forces the computer to jump to a defined line, which contains the desired subroutine, within the program. This is an unconditional loop that usually contains conditional loops nested within it; therefore, they are also called nested loops. A `GOSUB` subroutine must *always* end with the `RETURN` command. This command will force the computer back to the next command directly following the `GOSUB` command. The only exception is when the `RETURN` command is superceded by a `GOTO` or `IF/THEN` command.

The proper syntax for this command is `GOSUB`*xxxx*, where *xxxx* is the line number where the subroutine starts.

This command is useful when using a pause within a program, such as "Press any key to continue." You can place the `GOSUB` command at the end of the area where you want to pause the program. The program can then go to the subroutine and wait for the key press. After the key is pressed, it will return to the program command immediately after the `GOSUB` command.

Look at Listing 1 for an example of the `GOSUB` command.

### CHR$

The `CHR$` command converts a numerical value to a single character string. Use this when you want to send control codes to a software programmable printer or to print graphics characters to the screen or printer.

The proper syntax for this command is `CHR$(`*xxx*`)`, where *xxx* is the numerical value that is converted into a single character string.

### PRINTUSING

The `PRINTUSING` command prints the text following it in the format that was selected. This format is specified by putting characters behind the `PRINTUSING` command. These characters can be found by looking in your manual under the `PRINT` command area.

The proper syntax for this command is `PRINTUSING "$###,###,###.##" ;B`.Assume a value of one million for the integer variable B. This particular format will print the integer variable B in the format of `$1,000,000.00`. Or, for a value of 10,000 for B, it will print `$10,000.00`. Note that no matter what the value is, it will be printed with two decimal places to the right of the period, and the dollar sign printed 12 spaces to the left. The commas will only be printed when the value is great enough to warrant it.

This command is useful when you want to print a numerical value or character string in a particular fashion. One use for the `PRINTUSING` command would be in a program that prints values in dollars and cents.

### IF/THEN

The `IF/THEN` command tests variables to see if various conditions have been met. In standard BASIC the syntax is `IF/THEN GOTO`. But the Color Computer BASIC can shorten it by leaving off the `GOTO` command because it is assumed by the command interpreter.

Proper syntax is `IF X = Y THEN 1000`; when variable *x* equals the value of variable *y*, then the program will be forced to jump to Line 1000.

When multiple comparisons are to be made, you can use the `ELSE` command. The proper syntax for this use is `IF X = Y THEN 1000 ELSE 2000` or `IF X = Y THEN 1000 ELSE IF Y = Z THEN 5000 ELSE. . . .` When *x* equals the value of *y*, then force a jump to Line 1000, or else force a jump to Line 2000.

You can see that you can compare many different variables within a command line and keep memory requirements to a minimum.

### Looking at Listing 1

Line 10 clears the screen, moves the cursor down two lines and prints the text.

Line 15 forces the program to go to the subroutine located at Line 1000.

At Line 1000, the cursor is moved down the screen four more lines, and the text `"PRESS ANY KEY TO CONTINUE"` is then printed.

At Line 1010, string variable `B$` is set equal to the key pressed. Only in this instance we want a key to be pressed to continue the program, and we don't care which key. If no key is pressed, this line will be repeated by the `IF/THEN, ELSE` command directly following the `INKEY$` command. (Note that `IF/THEN, ELSE` is a variation on the `IF/THEN` command. The `ELSE` command helps shorten up the command line so that multiple comparisons can be made.

### Looking at Listing 2

Line 0 is a remarked line.

Line 5 clears 1,000 bytes of memory for variable storage, clears the screen and prints the text at the specified locations.

Line 10 prints text at the location, allows the input of variable `A` and sounds a tone.

Line 20 prints a string of blanks at the location to clear out the previous text; then it prints new text at the same location, allows the input of variable `B` and sounds a tone.

Line 30 forces the program to go to the subroutine located at Line 1000.

Lines 100 to 130 all sound a tone, perform mathematical manipulation of variables `A`, `B` and `C`, then force a jump to Line 500.

Line 140 sounds a tone and jumps to Line 700.

Line 200 prints a string of blanks at the location to clear out the previous text, then prints new text at the same location, allows the input of variable `B` and sounds a tone.

Line 305 forces the program to go to the subroutine located at Line 2000.

Lines 310 to 340 all sound a tone, perform mathematical manipulation of variables `A`, `B` and `C`, then force a jump to Line 500.

Line 350 sounds a tone and forces a jump to Line 700.

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Line 500 clears the screen and prints text at the specified location.

Line 510 sets up a `FOR/NEXT` command loop and sets a value for Integer `B`. Note that the loop will count to five before going on to another part of the program.

Lines 520 to 590 first print graphics characters at the locations specified, then set up a timing loop so the graphics character will be displayed for a desired amount of time before the next character. See your manual for the characters that can be printed to the screen.

Line 600 sounds a tone and informs the `FOR/NEXT` command set up in Line 510 that the next value of `B` should be counted.

Line 610 clears the screen, sounds a tone and prints text at the location; immediately following the text, the integer variable `C` is printed out in the format set up by the `PRINTUSING` command.

Line 620 forces the program to jump to Line 300.

Line 700 clears the screen, prints text at the location, allows the input of variable `A`, sounds a tone and forces a jump to Line 20.

Lines 1000 to 1070 comprise a subroutine that prints text at various locations. They then use the `INKEY$` to determine which key has been pressed and send the program to the appropriate line to perform the proper mathematical manipulation. These lines are 100 to 130.

Lines 2000 to 2070 make up a subroutine that prints text at various locations, then uses the `INKEY$` to determine which key has been pressed and send the program to the appropriate line to perform the proper mathematical manipulation. These lines are 310 to 340.

*(Questions or comments regarding this tutorial may be directed to the author at 901 Ferndale Blvd., High Point, NC 27260. Please enclose an SASE when writing for a reply.)* □

**Programming Exercises**

Utilizing the methods presented, write a program that allows you to enter your name, street address, city, state and ZIP. This program should also allow you to call a subroutine that prints up a menu that lets you recall each variable entered in turn.

Note: Use the commands found in this series to dress up your program any way you want. Feel free to experiment and have fun trying new things. A good way to learn new methods of programming is to find a program in which you like the way something is done, and examine the program to see how it is put together.

(*See Page 174 for a possible solution to this exercise.*)

**Hints and Tips**

When you program, you will find shortcuts to entering loops and variables. Each character within a program takes up memory in your computer, even the line numbers and spaces in the program. The overhead that the program uses cannot be eliminated. Therefore, you can minimize memory usage by combining lines. That will result in fewer line numbers and, therefore, a smaller program.

When programming, always number your lines in increments of 10 or 100 so that if you need to edit the program you can do so without changing the program flow drastically. Nothing puts a damper on programming like having to rewrite a program because you numbered the lines 1, 2, 3, 4 and 5 instead of 10, 20, 30, 40 and 50, which would allow plenty of room to make enhancements.

When you want to print one character string or text immediately following another character string or text; you must place a semicolon directly after the string value or text.

This short program will print the text in this manner:

```
THIS IS 1, 2, 3

10 CLS:PRINT"THIS IS 1,";
20 PRINT"2,";
30 PRINT"3."
40 END
```
□

**Listing 1:** `GOSUB`

```
10 CLS:PRINT:PRINT"THIS IS AN EX
AMPLE OF THE GOSUB COMMAND.  PLE
ASE NOTE THAT THIS IS LINE 10."
15 GOSUB1000
20 CLS:PRINT:PRINT"THIS IS THE S
ECOND PART OF THE  GOSUB COMMAND
 PLEASE NOTE THAT  THIS IS NOW L
INE 20."
25 GOSUB1000
30 CLS:PRINT:PRINT"THIS IS THE T
HIRD  PART OF THE  GOSUB COMMAND
 PLEASE NOTE THAT  THIS IS NOW L
INE 20. ALSO NOTE  THAT THIS IS
THE LAST PART OF   THIS DEMO ALS
O YOU MAY DO THIS  TYPE OF THING
 MANY, MANY TIMES. USING THE SAM
E GOSUB AREA."
35 GOSUB1000
40 CLS:PRINT:PRINT:PRINT:PRINT:P
RINT" THIS DEMO IS ENDED.  REBOO
TING       TO BASIC AT THIS TIME.
"
45 FORX=1TO1000STEP1:NEXTX:CLS:E
ND
1000 PRINT:PRINT:PRINT:PRINT"  P
RESS ANY KEY TO CONTINUE"
1010 A$=INKEY$:IFA$=""THEN1010EL
SE1020
1020 RETURN
```

**Listing 2:** `COCOCALC`

```
0 'THE COCO CALCULATOR HAS BEEN
WRITTEN TO DEMONSTRATE COMMANDS.
THIS PROGRAM IS TO BE USED WITH
THE BASIC PROGRAMMING COURSE
WRITTEN BY DAVID W. OSTLER, COPY
RIGHT 1987
5 CLEAR1000:CLS:PRINT@32,"WELCOM
E TO THE COCO CALCULATOR":PRINT@
96," PLEASE ENTER AMOUNTS YOU WA
```

```
NT     THE CALCULATOR TO WORK ON
"
10 PRINT@224,"FIRST AMOUNT";:INP
UTA:SOUND200,1
20 PRINT@224,STRING$(20,32):PRIN
T@224,"NEXT  AMOUNT";:INPUTB:SOU
ND200,1
30 GOSUB1000
100 SOUND200,2:C=A+B:GOTO500
110 SOUND200,2:C=A-B:GOTO500
120 SOUND200,2:C=A*B:GOTO500
130 SOUND200,2:C=A/B:GOTO500
140 SOUND200,2:GOTO700
300 PRINT@224,STRING$(20,32):PRI
NT@224,"NEXT  AMOUNT";:INPUTB:SO
UND200,1
305 GOSUB2000
310 SOUND200,2:C=C+B:GOTO500
320 SOUND200,2:C=C-B:GOTO500
330 SOUND200,2:C=C*B:GOTO500
340 SOUND200,2:C=C/B:GOTO500
350 SOUND200,2:GOTO700
500 CLS:PRINT@141,"WORKING"
510 FORB=1TO5STEP1
520 PRINT@236,CHR$(162);:PRINT@2
43,CHR$(161)
530 FORX=1TO50STEP1:NEXT
540 PRINT@236,CHR$(168);:PRINT@2
43,CHR$(164)
550 FORX=1TO50STEP1:NEXT
560 PRINT@236,CHR$(164);:PRINT@2
43,CHR$(168)
570 FORX=1TO50STEP1:NEXT
580 PRINT@236,CHR$(161);:PRINT@2
43,CHR$(162)
590 FORX=1TO50STEP1:NEXT
600 SOUND199,1:NEXTB
610 CLS:SOUND20,5:PRINT@64,"TOTA
L EQUALS:";:PRINTUSING"$###,###,
###.##";C
620 GOTO300
700 CLS:PRINT@224,"FIRST AMOUNT"
;:INPUTA:SOUND200,1:GOTO20
1000 PRINT@297,"DO YOU WANT TO"
1010 PRINT@330,"(A)DD"
1020 PRINT@362,"(S)UBTRACT"
1030 PRINT@394,"(M)ULTIPLY"
1040 PRINT@426,"(D)IVIDE"
1050 PRINT@458,"(E)ND"
1060 G$=INKEY$:IFG$=""THEN1060EL
SEIFG$="A"THEN100ELSEIFG$="S"THE
N110ELSEIFG$="M"THEN120ELSEIFG$=
"D"THEN130ELSEIFG$="E"THEN140ELS
E1060
1070 RETURN
2000 PRINT@297,"DO YOU WANT TO"
2010 PRINT@330,"(A)DD"
2020 PRINT@362,"(S)UBTRACT"
2030 PRINT@394,"(M)ULTIPLY"
2040 PRINT@426,"(D)IVIDE"
2050 PRINT@458,"(E)ND"
2060 G$=INKEY$:IFG$=""THEN2060EL
SEIFG$="A"THEN310ELSEIFG$="S"THE
N320ELSEIFG$="M"THEN330ELSEIFG$=
"D"THEN340ELSEIFG$="E"THEN350ELS
E2060
2070 RETURN
```

**Mouse Tales** By Logan Ward

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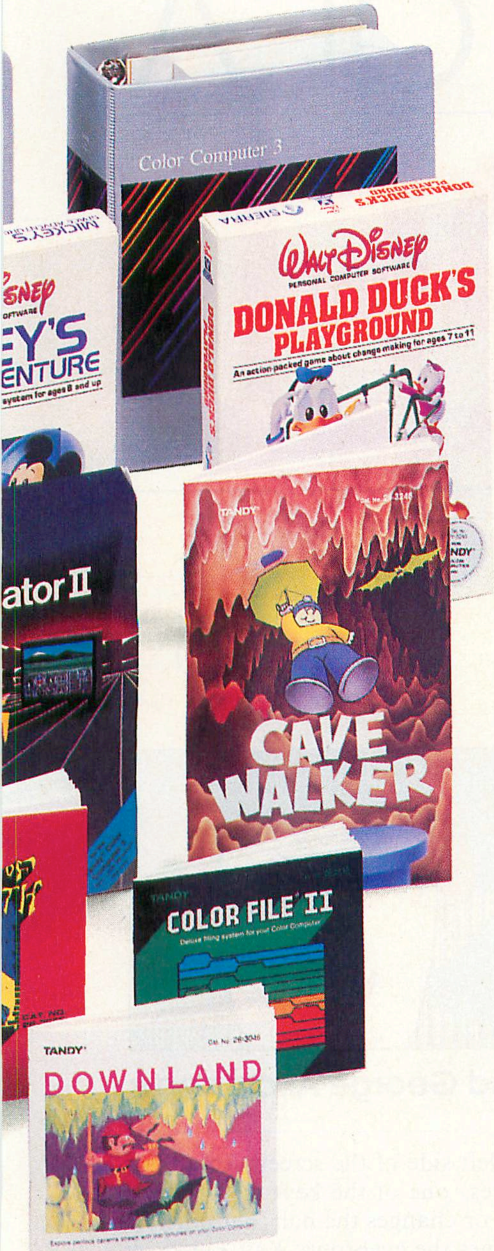

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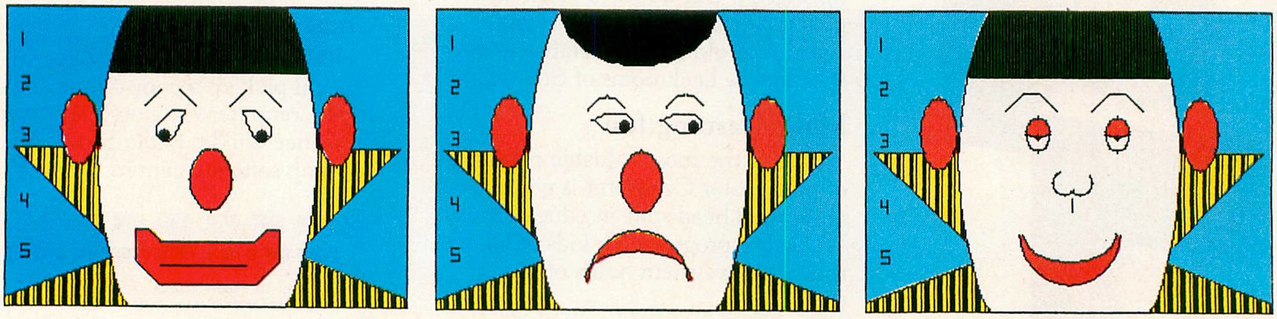

**By Bill Bernico and George Aftamonow**

Budding plastic surgeons, take note: With *Clown Faces* you can control facial features onscreen to create up to 120 different faces.

When you run the program, you'll see the general outline of a face. The numbers 1 through 5 are displayed down the left side of the screen. To add or change a feature, press one of the keys from 1 to 5. Key Number 1 adds or changes the hair/hat portion. Key Number 2 changes the eyebrows. Key 3 changes the eyes. Key 4 changes the nose, and Key 5 changes the mouth.

Once you have the features on the screen, press any of those keys again for a different combination; there are four combinations of each of the five features, making quite a large number of possibilities.

*(Questions or comments may be directed to Bill at 708 Michigan Ave., Sheboygan, WI 53081. Please enclose an SASE when requesting a reply.)* ☐

*Bill Bernico is a self-taught computerist who enjoys golf, music and programming. He is a drummer with a rock band and lives in Sheboygan, Wisconsin.*

*George Aftamonow is a self-taught programmer living in Milford, Connecticut, who enjoys creating and designing graphics.*

```
10 .......228
25 .......110
35 .......206
END ......63
```

**The listing:** CLOWNS

```
1 'CLOWNS by Bill Bernico
     amd George Aftamonow
2 PMODE4,1:PCLS1:SCREEN1,1:COLOR
0,1:LINE(0,0)-(255,191),PSET,B:D
RAW"BM10,25U8BM10,45R4D4L4D4R4BM
10,78R4D4NL3D4L4BM10,120D4R4U4D8
BM10,160R5U4L5U4R5":CIRCLE(128,9
6),70,0,2
3 I$=INKEY$:IFI$=""THEN3
4 I=VAL(I$):IFI<1OR I>5THEN3
5 ON I GOTO6,10,7,8,9
6 LINE(50,1)-(200,52),PRESET,BF:
GOSUB16:GOTO3
7 LINE(70,66)-(170,90),PRESET,BF
:GOSUB29:GOTO3
8 LINE(70,89)-(170,132),PRESET,B
F:GOSUB36:GOTO3
9 LINE(80,130)-(180,186),PRESET,
BF:GOSUB42:GOTO3
10 LINE(70,52)-(180,65),PRESET,B
F:GOSUB23:GOTO3
11 CIRCLE(128,96),70,0,2:CIRCLE(
210,78),12,0,2:CIRCLE(46,78),12,
0,2:LINE(220,90)-(250,90),PSET:L
INE-(194,148),PSET:LINE(38,90)-(
5,90),PSET:LINE-(65,148),PSET
12 POKE178,173:PAINT(200,100),,0
:PAINT(30,100),,0:POKE178,0:RETU
RN
13 CIRCLE(128,96),70,0,2:RETURN
14 CIRCLE(128,96),70,0,2:CIRCLE(
128,96),70,0,2:RETURN
15 CIRCLE(128,96),70,0,2:RETURN
16 F1=F1+1:IF F1=5THEN F1=1
17 ON F1 GOTO 18,19,21,22
18 GOSUB11:DRAW"BM76,0F46R10E46"
:POKE178,2:PAINT(85,5),,0:POKE17
8,0:RETURN
19 GOSUB13:CIRCLE(128,1),50,0,.7
,.9,.6:PAINT(128,5),0,0:RETURN
20 GOSUB13:CIRCLE(128,1),50,0,.7
,.9,.6:RETURN
21 GOSUB13:DRAW"BM98,0S8ND4BR3ND
6BR2ND8BR3ND10BR3ND10BR4ND12BR4N
D10BR3ND10BR3ND8BR3ND6BR4ND4S4":
RETURN
22 GOSUB13:DRAW"BM66,42R124":DRA
W"BM126,0D30R4U30":POKE178,1:PAI
NT(85,5),,0:POKE178,0:RETURN
23 F2=F2+1:IF F2=5THENF2=1
24 ONF2 GOTO25,26,27,28
25 GOSUB11:CIRCLE(108,94),20,,2,
.65,.85:CIRCLE(158,92),20,,2,.65
,.85:RETURN
26 GOSUB11:DRAW"BM88,63E11R10F11
 BR22E11R10F11":RETURN
27 GOSUB11:DRAW"BM114,60NH8DNH6B
R26NE8UNE6":RETURN
28 GOSUB11:DRAW"BM94,60R70DL70":
RETURN
29 F3=F3+1:IF F3=5THEN F3=1
30 ON F3 GOTO 31,32,33,35
31 GOSUB13:E1$="S8FRFNR4DNR4FNU2
RNU2RNU2ERERED2GDGLGL3HLHUHU2S4"
:DRAW"BM145,70"+E1$:DRAW"BM98,70
"+E1$:RETURN
32 GOSUB13:CIRCLE(158,78),8,0,1.
5,1,1:CIRCLE(108,78),8,0,1.5,1,1
:CIRCLE(108,76),8,0,.5,0,.5:CIRC
LE(158,76),8,0,.5,0,.5:CIRCLE(10
8,80),2,0,1,1:CIRCLE(158,80),2,0
,1,1:RETURN
33 GOSUB13:DRAW"BM150,66S8R4F5D3
G2L2H2UHUHU2HU":DRAW"BM113,66L4G
5D3F2R2E2UEUEU2EUS4"
34 CIRCLE(100,82),4,0,1,1:CIRCLE
(162,82),4,0,1,1:PAINT(100,82),0
,0:PAINT(162,82),0,0:RETURN
35 GOSUB13:E4$="S8RERER7F2D2GNGU
2HLGD2FNRL4HLH3S4":DRAW"BM142,70
"+E4$:DRAW"BM98,70"+E4$:PAINT(11
8,72),0,0:PAINT(164,72),0,0:RETU
RN
36 F4=F4+1:IF F4=5THEN F4=1
37 ON F4 GOTO 38,39,40,41
38 GOSUB14:CIRCLE(130,110),20,0,
1,1:RETURN
39 GOSUB14:CIRCLE(130,110),14,0,
1.5,1,1:RETURN
40 GOSUB14:CIRCLE(130,110),20,0,
.5,1,1:RETURN
41 GOSUB14:CIRCLE(125,109),8,0,1
,.1,.7:CIRCLE(135,109),8,0,1,.9,
.4:DRAW"BM130,119D8":RETURN
42 F5=F5+1:IF F5=6THEN F5=1
43 ON F5 GOTO 44,46,47,48,49
44 GOSUB15:CIRCLE(128,142),32,0,
1,0,.5:CIRCLE(128,142),30,0,.6,.
99,.51:LINE(0,185)-(68,160),PSET
:LINE(190,160)-(255,185),PSET
45 POKE178,200:PAINT(60,188),,0:
PAINT(220,188),,0:POKE178,0:RETU
RN
46 GOSUB15:CIRCLE(128,172),32,0,
1,.5,0:CIRCLE(128,170),34,0,.5,.
48,.02:RETURN
47 GOSUB15:DRAW"BM98,150R60E8R8D
20G15L61H15U20R8F8BD15R54":RETUR
N
48 GOSUB15:DRAW"BM98,145R60F8D18
L16H8L28G8L16U18E8BF8R40":RETURN
49 GOSUB15:DRAW"BM118,155E6R2F2N
D2E2R2F6NRL21F7R7E7":RETURN
```

# CBASIC-III

## The ULTIMATE Color Computer III Basic Compiler!!!

**If you want to write fast efficient Machine Language Programs and you don't want to spend the next few years trying to learn how to write them in Assembly language or with a cheap compiler, then CBASIC III is the answer!!!**

CBASIC III is the only fully integrated Basic Compiler and Program Editing System available for the Color Computer 3. It will allow you to take full advantage of all the capabilities available in your CoCo-3 including 512K RAM, without having to spend years trying to learn assembly language programming. CBASIC III allows you to create, edit and convert programs from a language you are already familiar with Enhanced Disk Color Basic, into fast efficient machine language programs easily and quickly. CBASIC III supports all the enhanced hardware available in the CoCo-3, including Hi-Res Graphics, & Screen displays, Extended Memory and Interrupts (Keyboard, Timer, Serial & Clock). It is 99% syntax compatible with Enhanced Disk Color Basic, so most Basic programs can be loaded and compiled with little or no changes required.

The compiler is an optomizing two-pass integer compiler that converts programs written in Basic into 100% pure 6809 Machine Language programs which are written directly to disk in a LOADM compatible format. The programs generated by the compiler are run as complete stand alone programs. A built in linker/editor will automatically select one and only one copy of each run-time library subroutine that is required and insert them directly in the program. This eliminates the need for cumbersome, often wasteful "run-time" packages.

### CBASIC III is for both Beginning & Advanced Users

CBASIC III is a Powerful tool for the Beginner or Novice programmer as well as the Advanced Basic or Machine Language programmer. You can write programs without having to worry about Stack Pointers, DP registers, memory allocation, and so on, because CBASIC III will handle it for you automatically. All you have to do is write programs using the standard Basic statements and syntax. For the Advanced Basic and Machine Language programmers, CBASIC III will let you take command and control every aspect of your program, even generating machine code directly in a program for specialized routines.

CBASIC III adds many features not found in Color Basic, like Interrupt and Reset handling, to give you a level of control only available to very advanced Machine Language programmers. Plus, we made it exceptionally easy to use, not like some other compilers. CBASIC III is the friendliest and easiest compiler available for the Color Computer III.

### CBASIC III has Full Command Support & Speed

CBASIC III features well over 150 Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. It also supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Enhanced Color Basic, including Graphics H/GET, H/PUT, H/PLAY and H/DRAW, all with 99.9% syntax compatibility. CBASIC III also supports the built in Serial I/O port with separate programmable printer & serial I/O baud rates. You can send and receive data with easy to use PRINT, INPUT, INKEY , GETCHAR and PUTCHAR commands.

CBASIC III is FAST. Not only will CBASIC III compiled programs execute 10 to several 100 times faster than Basic, but the time it takes to develop a CBASIC III program verses writing a machine language program is much, much shorter. A machine language program that might take several months to write and debug could be created using CBASIC III in a matter of days or hours, even for a well experienced machine language programmer. We had a report from one CBASIC user that claimed "a Basic program that used to take 3 hours to run, now runs in 7 to 8 minutes". Another user reported a program that took 1 to 1 & 1/2 hours to run in Basic, Now runs in 5 to 6 minutes!!!.

### CBASIC III is more than just a Compiler

CBASIC III has its own completely integrated Basic Program Editor, that can be used to create and/or Edit programs for the compiler. It is a full featured editor with functions designed specifically for writing and editing Basic programs. It has built in block Move and Copy functions with automatic program renumbering. Complete, easy to use inserting, deleting, extending and overtyping of existing program lines. It is also used for Loading, Saving, Appending (merging), Killing disk files and displaying a disk Directory. It also has automatic line number generation for use when creating programs or inserting sequential lines between existing lines. You can set the printer baud rate and direct normal or compiled listings to the printer for hard copy. The built in editor makes program corrections and changes as easy as "falling off a log". If CBASIC III finds an error when compiling, it points to the place in the program line where the error occured. All you have to do is tell the editor what line you want to start editing and when it is displayed, move the cursor with the arrow keys to the place where the error is and correct it. Just like that, it's simple.

### Selectable 32/40/64/80 Column Displays in 192 or 225 Res.

CBASIC III is the only Color Basic Compiler that includes it's own 32, 40, 64 or 80 by 24 line display in 192 or 225 Resolution. All of these display formats are part of the standard CBASIC III compiler package. Not only can they be used for normal program editing and compiling, but can also be included in your compiled programs, with a single command, "HIRES"!! The run-time display package is not just a simple "WIDTH 80" display, but a full featured package, far more advanced than the "WIDTH 40 or 80" displays. It will let you do things you expect like "PRINT @" as well as X,Y positioning. You can select characters per line, underline, character highlight, erase to end of line or screen, home cursor, home & clear screen, protect screen lines, and much more.

### 128K and 512K RAM Support

CBASIC III makes full use of the powerful and flexible GIMI chip in the Color Computer 3. It will fully utilize the 128K of RAM available and install 2 Ultra Fast Ramdisks if 512K is available, for program Creation Editing and Compilation. You can easily access all 512K of memory in a Compiled program thru several extended memory commands that can access it in 32K or 8K block and single or double bytes. CBASIC III also allows your program to use the upper 32K of RAM space automatically for variables or even program storage at run-time. It will automatically switch the RAMs in and out when needed. There are also two other commands that allow you to control the upper 32K of RAM manually, under program control. No other Color Basic compiler directly supports the use of Extended RAM like CBASIC III.

### All Machine Language

CBASIC III is completely written in fast efficient Machine Language, not Basic, like some other Color Basic compilers. Because of this, CBASIC III can edit and compile very large programs, even using the 80 column displays it can handle almost 40K of program. Some of the other Basic compilers can only work with 16K or about 200 lines. Even working with large programs, CBASIC III compiles programs with lightning fast speed. It will compile a 24K program to disk in less than 2 minutes! That's without a listing being generated. We've heard stories about some other compilers that take almost 10 minutes to compile a simple 2-3K program. You might inquire about this when you look at some of the other compilers available.

### Compare the Difference

CBASIC III is not just another Color Basic Compiler. It is the only complete Basic Compiler System for the Color Computer. Compare CBASIC III's features to what other compilers offer and you'll see the difference. When comparing CBASIC III to other compilers you might want to keep some of these questions in mind. Does it support I/O functions? You can't write much of a program without PRINT, INPUT and so on. What about complex string statements, or strings statements at all? Can you compile a complex string like: MID$(RIGHT$(DA$(VAL(IN$),LEN(LE$)),3,3)? How large of a programcan you write? Can you use two character variable names for string & numeric variables, like Basic? Does it support all the Hi-Res graphics statements including H/PLAY, H/DRAW, H/GET and H/PUT, using the same syntax as Basic? Do you ever have to use a separate Basic program? How long would it take to compile a 24K program? Can you take complete Basic programs an compile them without extensive changes? Will they work? How do you edit a program when it has errors compiling?

### The Finished Product

Since CBASIC III contains statements to support ALL of the I/O devices (Disk, Tape, Screen & Printer), Hi-Res Graphics, Sound, and Enhanced Screen displays, it is well suited for a wide range of programming applications. When CBASIC III compiles a program, it generates a complete, Ready to Run machine language program. The finished product or program does not have to be interfaced to a Basic program to perform some of its functions or commands. This may seem obvious to you, but some of the other Color Basic compilers don't necessarily work this way. Some of their compiler commands need a separate Basic program in order for them to work. In some cases, they require that a separate Basic program be interfaced to the compiled program to perform I/O functions, like INPUT, PRINT and so on. CBASIC III doesn't do this, ALL of it's commands are compiled into a single machine language program, that does not require any kind of Basic program to make it work.

### Price Verses Performance

The price of CBASIC III is $149.00, it is the most expensive Color Basic Compiler on the market, and well worth the investment. We spent over 3 years writing and refining CBASIC III, to make it the Best, most Compatible Color Basic compiler available. Most of our CBASIC III users already bought one or more of the other compilers on the market and have since discarded them. Before you buy a compiler, compare the performance of CBASIC III against any Color Basic compiler. Dollar for Dollar CBASIC III gives you more than any other Color Basic compiler available.

**Requires 128K & Disk $149.00**

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*"Over the years, few products have impressed me as much as this one."* ......................The Rainbow, December 1987

To order CBASIC III by mail, send check or money order for the amount of purchase, plus $3.00 for shipping & handling to the address below.
To Order by VISA, MASTERCARD or COD call us at (702) 452-0632
(Monday thru Saturday, 8am to 5pm PST)

**CER-COMP LTD.**
5566 Ricochet Avenue
Las Vegas, Nevada 89110
(702) 452-0632

# TEXTPRO-IV

## "The ULTIMATE Color Computer III Word Processing System"

- **9 Hi-Res Displays from 58 to 212 columns by 24 lines in 225 Res.**
- **Screen Display of Bold, Italic, Underline & Double Width print.**
- **9 Proportional Character Sets Supported with full Justification.**
- **80 Programmable Function Keys & Loadable Function key sets.**
- **Three Programmable Headers and One Programmable Footer.**
- **Automatic Footnote System places lines at the bottom of a page.**
- **7 Tab Commands, with: Center, Left, Right and Decimal align.**
- **Autoexecute Startup files for easy printer & system setup.**
- **8 Pre-Defined & 10 Programmable printer function commands.**
- **Supports Library files for unlimited printing & configurations.**
- **Disk file record access for Mail Merge & Boiler Plate printing.**
- **Complete Automatic Justification, Centering, Flush left & right.**
- **Change indents, margins, line length, etc. anytime in the text.**
- **Create and Edit files larger than memory, up to a full disk.**
- **Easily imbed any number of printer format and control codes.**
- **Compatible with all printers including Laser printers.**
- **Built in Ultra Fast 2 drive RAMDISK for 512K support.**

TEXTPRO IV is the most Powerful Word Processing System available for the COCO-3, designed for speed, flexability and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, and never expect to use multiple fonts or proportional printing, then most likely you'll be better off with one of the other simple word processors. But, if you want a powerful word processor with extensive document formatting features to handle large documents, term papers, manuals, complex formatting problems and letter writing, then TEXTPRO IV is the answer. It works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 70 different formatting commands you can use without ever leaving the text your working on. There are no time comsuming and frustrating menu chases, you are in total control at all times. You can display the formatted document on the screen before a single word is ever printed on your printer. Including margins, headers, footers, page numbers, page breaks, column formatting, justification, and Bold, Italic, Underline, Double Width, Superscript and Subscript characters.

TEXTPRO IV can even support LASER PRINTERS with proportional fonts, take a good look at this AD? It was done with TEXTPRO IV on an OKIDATA LASERLINE-6 laser printer!!! All of the character sets used on this AD are proportional, all centering, justification, font selection, and text printing was performed automatically by TEXTPRO IV.

### What you see is what you get!

TEXTPRO IV has 9 Hi-Resolution screen fonts to choose from, with 58 to 212 characters per line in 225 Resolution, for the best display possible. You can easily match the width of your printed page to the screen and you can have it automatically change display widths as you change printer fonts so you can even display the "fine print". All of the screen fonts can display, Bold, Italic, Underline, Superscript, Subscript and Double Width characters. When you you want to see what your printed document will look like, TEXTPRO IV will let you see it on the screen in all its glory, so that, "What you see is what you get".

### Standard Commands

TEXTPRO IV has all the document formatting commands you expect in a word processor and then some. The setup commands include: line length, top margin, bottom margin, page length, page numbering on/off, page format on/off, automatic word fill on/off and justification left, center, right or full. Some of the Vertical control features include: Test for a number of lines left on a page, skip to next page, set page number, page pause, single and multiple line spacing.

TEXTPRO IV features 3 programmable Header lines that can be centered, left or right justified and one programmable Footer line. There are 3 commands for continious, single and paragraph indenting, Center Text, Center Line and Right Justify text with character fill.

### Printer & Special Commands

TEXTPRO IV has 8 pre-defined printer & screen commands for Bold, Italic, Double Width, Underline, Subscript, Superscript, Condensed and Double Strike print. It also has 10 programmable functions that you can use to access intelligent printer features like: Graphics, variable line spacing, half line feed, horizontal & vertical positioning. There are also 3 other printer commands that allow you to imbed control code sequences anywhere in the text.

There is a Footnote command that will automatically place footnotes at the bottom of the page. Another command allows you to display a message on the screen and input text from the keyboard, to be included in your printed document. There is also a repeat command that allows you to repeat an entire document or part of one, up to 255 times.

### Tab Functions

TEXTPRO IV features an elaborate system of tab commands for complete control over column formatting. There are 10 programmable tab stops that can be defined and re-defined at any time. They can be used to: Center over Tab column, Right Justify to Tab column, Decimal Align over Tab column, Left Justify to Tab column (Normal Tab) and Horizontal Tab. They can also be used with a numeric column position for maximum flexibility.

### Proportional Fonts & Printing

TEXTPRO IV is the only Color Computer III Word Processing system that gives you Justified Proportion Printing, which can give your documents and letters that professional touch that just isn't obtainable with fixed or mono spaced printing. And just about all printers today support proportional fonts, and with Laser Printers you can get typesetting quality output for just pennies a page. TEXTPRO IV supports up to 9 proportional fonts, with full justification. And, you can even mix mono spaced and proportional fonts for maximum flexability. Even if you don't use proportional printing, you can select between Pica, Elite and Condensed fixed width fonts to get fully justified printing.

### Mail Merge and Text Processing Disk Functions

TEXTPRO IV supports several commands that allow you to import data or text from other disk files. They allow you to include information like names and addresses for Mail Merge capability, Import standard paragraphs or other information for Boiler Plate type functions and more. Some of the commands include: Open a file, Field a Record, Read a Record into fielded variables, Read single or multiple lines and Trim spaces from the trailing end of fielded variables.

Another powerful disk function not to be overlooked is the "LIBRARY" command that allows you to include the entire contents of a file in your text. This can be very useful for a great many applications. You can use a Library command to automatically include a standard or optional printer setup command file, or to include standard paragraphs, headers or information created from a spread sheet or any other program. And, for printing very large documents that consist of several files linked together.

### Autoexec Startup Files

TEXTPRO IV will automatically load and execute a command text file when it first executes. This allows you to customize the program configuration for your system and printer whenever you startup TEXTPRO IV. You can setup the screen display format, colors, adjust automatic key repeat, printer baud rate, load a set of function keys, load your printers control codes and more.

### 80 Programmable Function Keys

TEXTPRO IV allows you to have up to 80 function keys with just about any kind of information or command sequences you can imagine. Once programmed, you can have a command sequence execute using a single function key. You can also Save and Load function key sets at any time. So, you can have several sets for different writing tasks or projects, the possibilities are endless. Just think, with a single function key you could, load a disk file, search for and replace all the occurances of a phrase, save the file back to disk, have it processed and printed!

### Text Editing

TEXTPRO IV has a powerful, full featured, line oriented screen editor that is faster and more efficient then most editors you've ever worked with. It supports single or multiple line copy and move, global or local search and replace, word and character insert/delete, block delete and much more. It features adjustable automatic key repeat, selectable display foreground and background colors, screen line width and more.

TEXTPRO IV uses fully compatible ASCII formatted files. You can even direct formatted output files to a standard ASCII disk file. It will Load, Save, Append, Kill, Text Process files from disk, Roll part of a file to disk, Get next portion of a file, display a Directory and Backup Ramdisk to & from Floppy disks.

TEXTPRO IV's files are also compatible with spelling checker programs like Spell 'n Fix from Star Kits, a shareware program, available with TEXTPRO IV for your evaluation, just for the asking.

### Fully Buffered Keyboard

While many word processing programs are slow and often lose keystrokes. TEXTPRO IV has a fully buffered keyboard that is virtually impossible to out type. Even when it's busy, it will still remember the keystrokes entered. You can enter in commands or whatever, even during insert mode you'll never lose a key.

### Professional Word Processing Power

TEXTPRO IV is a powerful tool for both the Casual and Professional Word Processing user. It offers a wide range of features and functions that can satisfy even the most demanding writer. Even though you may not need all of TEXTPRO IV's power and flexability right now, its not a program that you can easily outgrow. As your needs and skills improve, you'll discover that you won't need to go out and buy another word processing program, TEXTPRO IV will already be ready and waiting. No Text Processing program available for the Color Computer III gives you more Text Processing Power than TEXTPRO IV. It can make your writing appear more professional than you ever thought possible. Check around, see what other word processing programs have to offer in terms of power, speed and flexability. When your finished comparing them against TEXTPRO IV, you'll see that it's the only real choice for the Color Computer III.

**Requires 128K & Disk $89.95**

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To order TEXTPRO IV by mail, send check or money order for the amount of purchase, plus $3.00 for shipping & handling to the address below.
To Order by VISA, MASTERCARD or COD call us at (702) 452-0632
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**Coming Soon: CoCo 1 & 2 versions of TEXTPRO IV**

# SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, which appears bimonthly, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

## FEEDBACK

In response to questions from:

- Ron Smith: In *Dungeons of Daggorath*, you incant the Vulcan ring as Fire and you receive an iron sword from one of the two blobs on the first level. On the second level, three stone giants bearing axes instead of clubs carry flasks. On the third level, three evil knights hold them. Also on the third level, you must be burning a lunar torch to even see most of the creatures.

You will receive a torch on the second level which you can't reveal. It is a solar torch and will enable you to see what's invisible with a pine torch. The creature that is killing you is the scorpion. Even with the lunar torch burning, the scorpion is hard to see. You can see it perfectly with the solar torch burning. If you have the lunar torch burning, you will find the scorpion in the bottom-left corner of the screen. One shot from the iron sword will kill it.

- Mike Morrell: In *CoCo Zone*, you get the oxygen from the cabinet in the infirmary. You get the key from the safe in the warden's office, but go into the warden's office by way of the panel.

- Daniel Streidt: In *Black Sanctum*, there is a jug of wine in the room with the fireplace. Take this jug to the old man upstairs through the mirror. Find the old man when he leaves and get the jug again. The jug is used to hold the snow when it melts. Go outside and type `GET SNOW`.

- Greg Barnes: In *Shenanigans*, you must move through the woods until you find the unicorn horn. Type `BLOW HORN` and a leprechaun drops the rope at your feet.

- Shawn Bonning: In *Dungeons of Daggorath*, there are five levels of play. But what you are concerned about should be the third level. As soon as you climb down the hole to the third level, drop about 10 to 15 items as quickly as possible. When an evil knight comes, he will start to pick up your items. Hit him until you faint, then let your heart calm down a little, then hit him once every four to five seconds.

The scorpions take one shot from the iron sword, but they can kill you just as quickly. You can see them with a lunar torch, but only if they're right on top of you. The solar torch works better, though.

Wraiths are the floating faces you see on the fourth level. To kill them, let your heart calm down almost totally, drop one item and hit them until they die. A good defense against any fourth level monster is to find a medium-sized hall and move back and forth around him until your heart is settled enough to attack.

*James Stakelin*
*Cynthiana, KY*

- Darren King: In *Dungeons of Daggorath*, you must first construct a map of levels 1 and 2. You are exerting too much energy on Level 1. Follow a course covering the parameter of the level. As you hear the creature, stop, pull your shield and type `AR` if your sword is in the right hand. As soon as the monster enters your cell, press ENTER, type `M` and press ENTER again. Now type `M` and `AR`. It gives your heartbeat time to slow down and gives you a chance to look at your map.

*B. Keith Dougherty*
*Altoona, PA*

- Russ Maede: In *Sea Quest*, as you are on the beach, continue East until you have passed the steps. Presuming you have the metal detector, type `PUSH BUTTON`. The detector will buzz loudly. Use the shovel to dig and you will find a mirror. Take this to the mermaid. Type `GIVE MIRROR`. When you do this, the mermaid will give you the key to the trap door in the beach house.

In *Zaxxon*, how do all the scoreboard highs earn at least 1 million points? I can't manage to get more than 150,000 because of fuel loss. In *Sea Quest*, how do you successfully drop everything in the cave?

*Tim Everson*
*Sandusky, OH*

- Ian Renauld: To get past the sheer wall in *Martian Crypt*, type `SAY MORE AND JUMP`.

- Neil Lehouillier: In *Martian Crypt*, throw the stalactite at the wraith which you find in the underground river entrance.

*Dale Kaczmarek*
*Oaklawn, IL*

- Nila Grose and Ian Renauld: In *Sea Quest*, you cannot get the speargun, and you get by the shark by using shark repellent. It is in a locked part of the house, and the mermaid will give you the key if you give her the right article. Try tying the balloon to the anchor and then inflating the balloon underwater. At the start of Bashan, go north and get the lamp, then go east to the crack, get what is in the crack and rub the lamp. Go north until you are in the city.

- Louie Elliott: In *Zork I*, the key to unlock the grating can be found in the maze with the skeleton. The basket and the chain are to lower things to a lower level that you will need, such as a torch, coal and a screwdriver, but you cannot take it with you because the doorway is too narrow.

*Richard King*
*Plymouth, IN*

- Mike Duvall: To get the scepter in *Sands of Egypt*, you must have the snake oil in the canteen. At the pool, type `WALK TREE`. Climb the tree and get the dates. Go down and then go east two times. Type `FEED CAMEL`, `MOUNT CAMEL`, `RIDE CAMEL` and `DISMOUNT`. Oil the scepter and pull it. Don't eat the dates yourself, they might be useful later.

- Allen Bell: At the top of the cliff in *Sands of Egypt*, go down. Go west until you are in the sand and out of the base of the cliff. Go south, then east and you'll be at the pool.

- Jason Mielke: In *Sands of Egypt*, with the ladder, just float down the river until you see a hole in the ceiling. Type `DROP LADDER` and `CLIMB LADDER`.

*Phil Derksen*
*Hendersonville, NC*

- Scott Garling: In *Vortex Factor*, to open the safe, open the desk in the same room. On the documents you will find the numbers.

How do you open the main door in the hall? Also, in *Syzygy*, what are the coordinates for the transporter?

*Robert Limoges*
*Pincourt, Quebec*

- Michael Sargent: In *Raaku-Tu* do what I did — get mad. Kick the altar; it moves and opens to a secret passage.

*Zak Peloquin*
*North Kingston, RI*

*Scoreboard:*

Whenever you go to the third level in *Dungeons of Daggorath*, it's best you fight at least 10 or more creatures before going up against the wizard's image. The secret to beating the wizard's image is simple. When you hear him coming, have one ring in your left hand and a Hale flask in your right. Type `AL` and wait. As soon as he is in front of you press ENTER. As soon as you hear the ring fire, move forward as many times as possible. Don't wait for the ring to stop firing before you move or he will get his turn and kill you. After running, turn and use the Hale flask. Drop it and pull another Hale or Thews flask. Repeat these steps again.

Remember: "Behold! Destiny awaits the hand of a new wizard!"

*Kevin Neil Shimp*
*Woodstown, NJ*

*Scoreboard:*

In *Dungeons of Daggorath*, how do you kill the real wizard in Level 6?

In *Sands of Egypt*, how do you find the scepter and what is the purpose of the magnifier?

*Greg Fields*
*Comanche, TX*

*Scoreboard:*

In *Dungeons of Daggorath*, how do you kill the knights without the rings? On Level 1, I have encountered a creature that fills the entire screen. What is this creature and how can it be destroyed?

*Jeff Moore*
*Gaffney, SC*

*Scoreboard:*

How do you defeat the wizard's image on the third level of *Dungeons of Daggorath*? I have used the rings to defeat the evil knights. Are they the secret?

*Bill Davis*
*Vidalia, LA*

*Scoreboard:*

Once I have killed the wizard's image in *Dungeons of Daggorath*, I am transported to a different level, and everything that I have previously saved in my backpack disappears. Just before I am transported, the wizard's image leaves a scroll. How do you stop the contents in the backpack from disappearing and how do I get back to my original level and get the scroll?

*Daniel Thickins*
*Simoce, Ontario*

*Scoreboard:*

In *Dungeons of Daggorath*, type `INCANT FIRE` to incant the Vulcan ring. There are no scrolls or flasks on the first level. The torches acquired on the first level that won't reveal are lunar torches. They will usually reveal after one or two knights on the second level have been killed. To defeat the knight on the second level, you must attack several times, move down the hall a few spaces and turn around. Repeat this process until he is dead.

In *Zork I*, the cyclops can be scared away by typing `ODYSSEUS`.

In *Raaku-Tu*, what do you do when you have safely exited the temple?

*Matthew Yarraus*
*Easthampton, MA*

*Scoreboard:*

In *Pyramid 2000*, how do I get out of the maze? Do I need any objects to get out?

*Jeff Remick*
*Warren, MI*

*Scoreboard:*

In *Pyramid 2000*, when you get to the west end of the Twopit room go down, type `POUR WATER` and the plant will grow. Climb the plant and you will get a key and the golden eggs.

How do you get from the maze to the pharaoh's treasure chest?

*Peter Antonacopoulos*
*Toa Baja, Puerto Rico*

*Scoreboard:*

In *Dallas Quest*, how do I get the flashlight and the knapsack down the ladder at the trading post and still be able to turn the flashlight on?

To get past the snake, examine the parrot. Pull the curtain to get the flashlight at the trading post.

*Robert Taylor*
*Yuma, AZ*

*Scoreboard:*

How do I get the flashlight in *Dallas Quest*? Once I do find the flashlight, how do I get down the ladder with it and the knapsack?

*Rick Moore*
*Greensburg, IN*

*Scoreboard:*

In *Sands of Egypt*, the axe is on top of the pyramid. Keep the shovel throughout the game. Leave the water and dates outside of the pool before you go into the opening. The dates can be found up in the trees.

When entering the treasure room, drop all items, except the torch. This way you have enough room to fit in the cracked wall. All you need is the ladder, and remember to go out the same way you came in.

Remember to untie the rope from both the pole and the boat. When you reach the hole in the roof, type `PLACE LADDER` and `CLIMB LADDER` before you are swept over the falls. When done, just ride the camel home.

*Joe Boccia*
*E. Northport, NY*

*Scoreboard:*

How do you get the torch and the magnifying glass in *Sands of Egypt*?

*Brian Hill*
*Crawfordsville, IN*

*Scoreboard:*

In *Bedlam*, you must open the door of your cell in order to exit. Then, type a directional command. How do you get past the dog and how do you get the green key in the therapy room?

In *Hitchhiker's Guide to the Galaxy*, in order to get the plotter you must first have the babel fish and second, you must listen to Prostetnic Jeltz's poetry. Beware though, Jeltz's first poem is not his favorite. He won't read more unless you signify that you're enjoying it.

Do you need a cutting tool in *Sands of Egypt*? If so, where can you get it? How do you get palm fronds?

*Graham Stinson*
*Edmonton, Alberta*

**To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will immediately forward your letter to the original respondent and, just as importantly, we'll share your reply with all "Scoreboard" readers in an upcoming issue.**

**For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.**

**— Jody Doyle**

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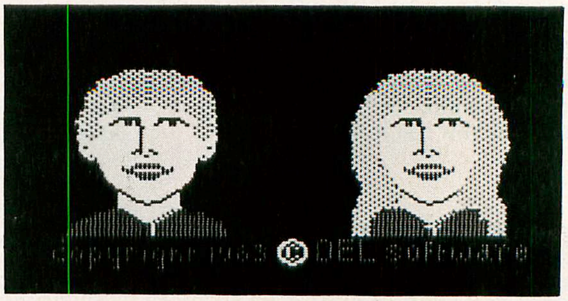

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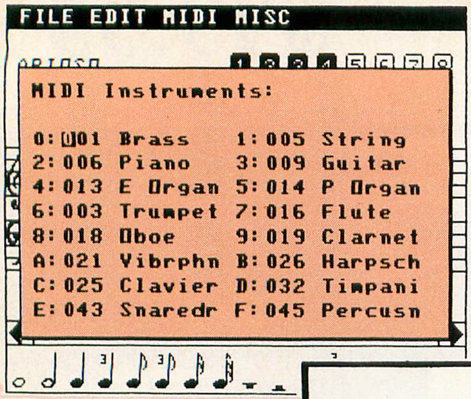

```
FILE EDIT MIDI MISC

MIDI Instruments:

0:001 Brass    1:005 String
2:006 Piano    3:009 Guitar
4:013 E Organ  5:014 P Organ
6:003 Trumpet  7:016 Flute
8:018 Oboe     9:019 Clarnet
A:021 Vibrphn  B:026 Harpsch
C:025 Clavier  D:032 Timpani
E:043 Snaredr  F:045 Percusn
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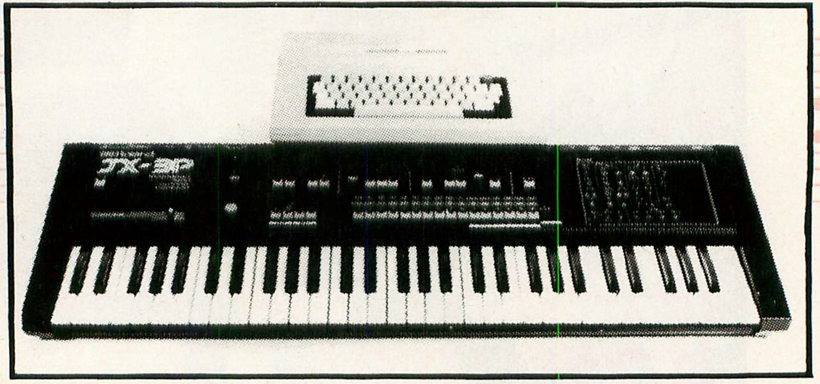

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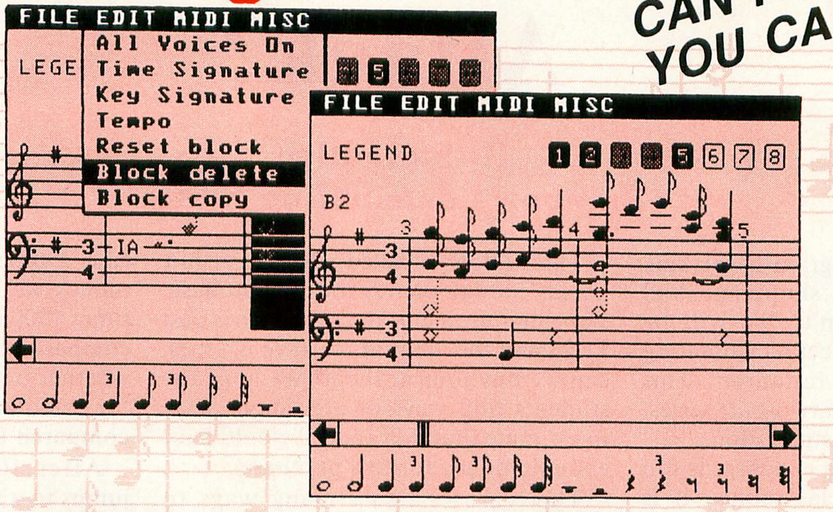

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*The first of a two-part series on estimating expenses*

# Can You Afford a Burger Attack?

**By Steve Blyn**
**Rainbow Contributing Editor**

This month's program is for kids who like to go shopping. And what kid doesn't? We will be concerned with the aspect of estimating expenses at a fast food restaurant. This program is the first of a two-part series, but each program can stand alone.

The art of estimating expenses is too often overlooked in classrooms. It is truly important to know how to compute them; it is also important to be able to compute purchases. Methodology and computation, however, are often taught to the exclusion of estimation. The truth of the matter is that when we go shopping, the skill of estimating expenses is the most crucial of the three.

An increasing number of people carry calculators with them at all times. I am one of those who wears a calculator on the wrist. (Of course, one has to have Smurf-size fingers to operate it.) But most people do not feel comfortable pulling out their calculators in stores such as Burger King — people will stare! Thus, even armed with a calculator, one still should be familiar with estimating expenses.

*Fastfood* presents a list of four fast food items. Of course, there are many more items on the menu, but we have pared the list to four so that the items are easy to locate. The prices for each item vary from round to round. Each example chooses a random quantity of an item and a random amount of money for the student to spend.

The student is asked whether or not he has enough money for the purchase. For example, if chicken sandwiches cost $1.25 and the amount we have is $5.20, can we buy four of them? We hope the students find ways or are taught ways to estimate that they indeed would have enough money for this purchase.

There are certainly many ways to perform the estimation. We hope you help your children learn one method that works for them. It helps to verbalize the methods. Being able to vocalize thoughts generally helps to clarify them. But no matter which method is used, encourage the students not to use pencil and paper.

Program lines 50 through 110 set up the screen and present the four food items and their prices for each example. The prices are chosen randomly within the limits set by these lines. Line 140 prints the variable `M`, which is the randomly selected amount of money that we have for each example.

Line 150 contains the variable `J`, which is the amount of the particular food item we want to purchase. `J` is always a random number chosen between 3 and 6. `N$` represents the name of the particular food item selected. The variable `AA` represents the cost of one of this item.

The total cost of the items is therefore `J` times `AA`. The total amount of money we have at any given time is `M` times 100(cents). Lines 220 through 240 compare these two values to determine whether or not we have enough money for the total purchase. The result is then compared to the student's response.

After 10 examples, the program jumps to a report card. A scoreboard is presented on lines 370 through 430. The student may either end the program or go on to a new round of examples.

We hope your children/students are able to make good use of this program. We feel that the skill of estimating is an often overlooked, but essential, skill of daily adult living. Next month we will present Part 2, a similar program that actually tests the students in computing their fast food expenses. ☐

---

*Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.*

**The listing:** `FASTFOOD`

```
10 REM"ESTIMATING EXPENSES"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1988"
30 CLS5:IF CT=10 THEN 370
40 J=RND(4)+2:D=RND(-TIMER)
50 PRINT@3,"YOUR MENU";:IF CT=9
THEN PRINT@28,CT+1; ELSE PRINT@2
5,"#";CT+1;
60 LA=0:ZA=0:F=0:YE=1:AA=0:BB=0
70 FOR T=1056TO1087:POKET,243:NE
XT:SOUND100,3
80 CH=120+RND(40):PRINT@98,"CHIC
KEN-$";:PRINTUSING"#.##";CH/100;
90 SA=70+RND(20):PRINT@162,"SALA
D  -$";:PRINTUSING"#.##";SA/100;
100 SD=32+RND(20):PRINT@114,"SOD
A  -$";:PRINTUSING"#.##";SD/100;
```

```
110 CO=40+RND(20):PRINT@178,"COF
FEE-$";:PRINTUSING"#.##";CO/100;
120 FOR T=1248 TO 1279
130 POKET,252:NEXTT:SOUND200,2
140 M=70+RND(30)*10:M=M/100
150 GOSUB 310:PRINT@288,"YOU WAN
T TO BUY";J;N$;"S."
160 PRINT@352,"IS $";
170 PRINTUSING"#.##";M;
180 PRINT" ENOUGH FOR THIS ? ";
190 Z$=INKEY$
200 IF Z$="Y" OR Z$="N" THEN 210
 ELSE 190
210 PRINTZ$:CT=CT+1
220 IF Z$="Y"AND M*100>J*AA THEN
 260
230 IF Z$="Y" AND M*100=J*AA THE
N 260
240 IF Z$="N" AND M*100<J*AA THE
N 260
250 GOTO 280
260 RI=RI+1:PRINT@428,"CORRECT";
270 FOR T=200TO255STEP11:SOUNDT,
1:NEXTT:GOTO 290
280 PRINT@428,"SORRY";:SOUND 10,
3
290 PRINT@484,"PRESS <ENTER> TO
GO ON ";
300 EN$=INKEY$:IF EN$=CHR$(13) T
HEN 30 ELSE 300
310 RN=RND(4)
320 IF RN=1THEN N$="CHICKEN":AA=
CH
330 IF RN=2 THEN N$="SALAD":AA=S
A
340 IF RN=3 THEN N$="SODA":AA=SD
350 IF RN=4 THEN N$="COFFEE":AA=
CO
360 RETURN
370 CLS8:FOR T=1024TO1055:POKET,
214:PLAY"L100;G":NEXT:PRINT@37,"
HERE IS YOUR SCORECARD";
380 FOR T=1119TO1088STEP-1:POKET
,214:PLAY"L100;A":NEXTT
390 PRINT@202,"SCORE = ";10*RI;"
%";
400 FOR T=1344TO1375:POKET,214:P
LAY"L100;A":NEXT T
410 PRINT@416," ":PRINT@448," ":
PRINT@418,"DO YOU WANT TO PLAY A
GAIN? ";
420 EN$=INKEY$
430 IF EN$="Y" THEN RUN ELSE IF
EN$="N" THEN END ELSE 420
```

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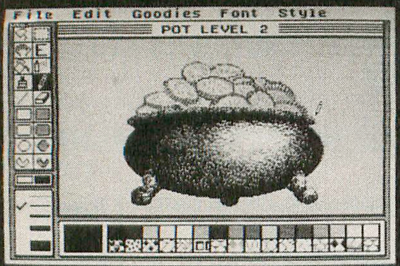
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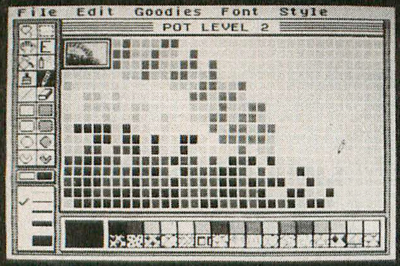
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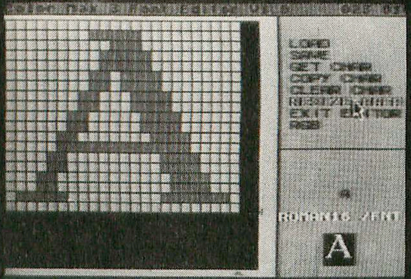
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COPY CHAR
CLEAR CHAR
EXIT EDITOR
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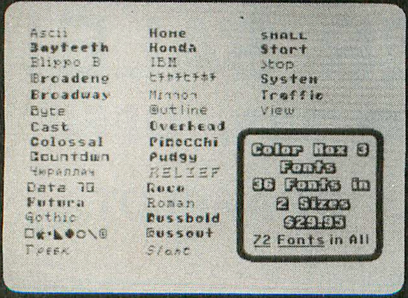
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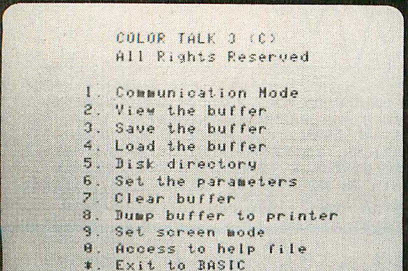

```
COLOR TALK 3 (C)
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1. Communication Mode
2. View the buffer
3. Save the buffer
4. Load the buffer
5. Disk directory
6. Set the parameters
7. Clear buffer
8. Dump buffer to printer
9. Set screen mode
0. Access to help file
*. Exit to BASIC
```

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Unleash the power of your CoCo 3 with 320 x 200 screen resolution, and the choice of any 16 colors from the CoCo 3's 64 color palette, and your graphic creations almost can't help but come alive with color and detail. Icons, pull down menus, and dialog boxes make COLOR MAX 3 very easy to use. 11 fonts are supplied, making hundreds of lettering styles possible. Text can use any combinations of color, shadow, outline, bold, and italics. Painting is a snap with 16 colors and 32 editable patterns. COLOR MAX 3 requires a 128K CoCo 3 with disk drive, High-Resolution Joystick interface, and a joystick device (mouse, touch pad, or joystick). Print drivers supplied for most popular printers. CGP 220 driver provides beautiful 16 color print-outs.

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**Standard Hi-Res Joystick Interface**
(Radio Shack # 26-5028)
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**Color Max 3 FONTS**©
36 Fonts in two sizes
72 fonts in all!
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6 Picture Format Converters:
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- **6K artifact binary to "MGE"**
- **Graphicom B&W to "MGE"**
- **Graphicom artifact to "MGE"**

(MGE is Color Max 3 Pix format)
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**Picture Converter 2**©
Converts ATARI™ Low Res 320x200 picture files to "MGE" format used by Color Max 3. Works with ATARI pictures with file extensions .ST, .NEO, and .TNY.

NOTE: This utility is designed to allow the user to retrieve picture files from Bulletin Boards and Information Services. Files must be "Un-Arced".
Most databases have "UN-ARC" utilities available.
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**INTRODUCING. . .**

## COLOR TALK 3©

**The Complete Terminal/Communications Program you've been waiting for!**

Ideal for accessing Compuserve, Delphi and other Information Services. Send your Color Max 3 "MGE" pictures to friends and fellow COCO users. **THIS IS THE ONLY COMMUNICATIONS PROGRAM AVAILABLE FOR YOUR COCO WITH ALL OF THIS POWER!** Compare COLOR TALK 3 with programs for the "PC" market costing 4 to 5 times as much. I'm sure you'll agree that COLOR TALK 3 represents real value for your COCO Dollars!

**Just look at this partial list of Impressive Features:**

•Supports COCO 3 as well as COCO 1 & 2. •Screen Display options: COCO 3: 80x24, 40x24, 32x16 . . . Standard COCO: 32x60, 32x24, 51x24, 64x24, 85x24. •Supports PBJ Wordpack & Double 80+. •XMODEM & YMODEM. •Upload & Download. •Save to buffer or direct to disk. •Full ASCII XON/XOFF support. •ASCII filtering. •ASCII buffering. •Customizer-set and store frequently used options/parameters. •10-64 character user programmable macros. •Conference/Chat mode. •Selectable Baud rates of 110, 300, 600, 1200, 2400, 4800, 9600 (Radio Shack RS232 Ram required for baud rates above 2400). •Parity: Odd, Even, Mark, Space, None. •VT-52 Terminal Emulation. •Duplex: Half, Full, Echo. •Set Begin Block/End Block for selected save and print functions •Browse/View through buffer. •Define margins, word-wrap, and justification for print-outs. •Complete support of the COCO's serial port and the RS232 Pack. •Optional prompted ASCII upload •Customize Colors to suit your display. **Much, Much More!**

**Cat. # 255MD** Disk only . . . . . . . . . . . Introductory price . . . Just $49.95

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In addition to the features and quality incorporated in the original Color Max 3, take a look at this partial list of impressive enhancements included in the new **COLOR MAX DELUXE:**

- **EDIT MULTIPLE SCREENS - SIMUTANEOUSLY!**
- **STRETCH & SHRINK** - ANY PROPORTION!
- **ANIMATION - VARIABLE SPEED!**
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**COLOR MAX DELUXE** REQUIRES 512K RAM which provides for **SUPERIOR SPEED & POWER!**

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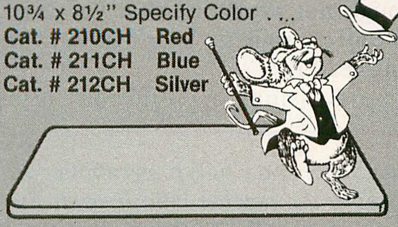

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**HARDCOPY** is more that just a screen print utility, compare these features with any other graphic dump program on the market: Gray Scale or B&W printouts, 1x1, 2x2, 3x3, Lables, posters, and greating cards with your graphics and much much more! **HARDCOPY** requires a 64K CoCo (I,II, or III) and disk drive. Please specify printer and catalog # when ordering.

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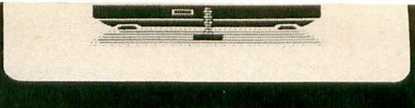

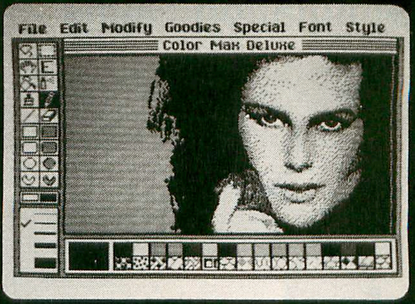
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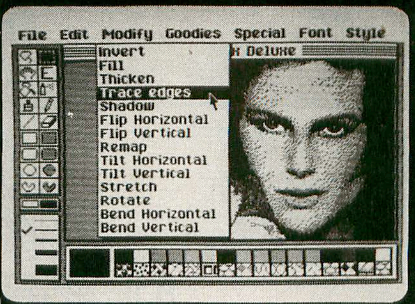
Color Max Deluxe


File Edit Modify Goodies Special Font Style
Invert
Fill
Thicken
Trace edges
Shadow
Flip Horizontal
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Remap
Tilt Horizontal
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Rotate
Bend Horizontal
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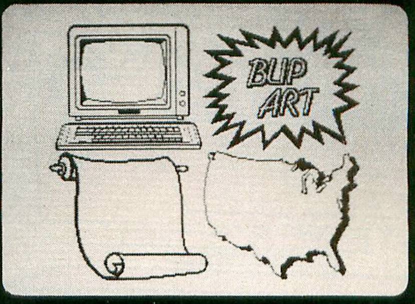
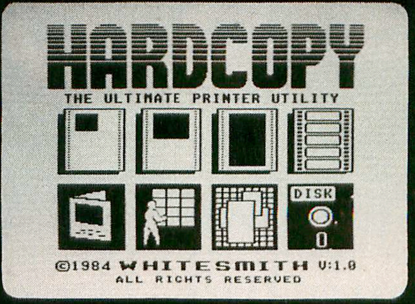
x Deluxe

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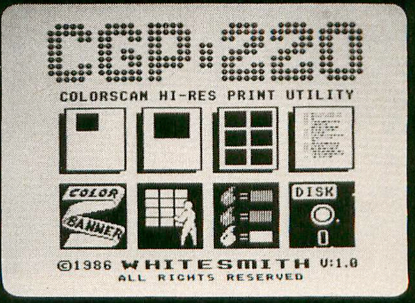
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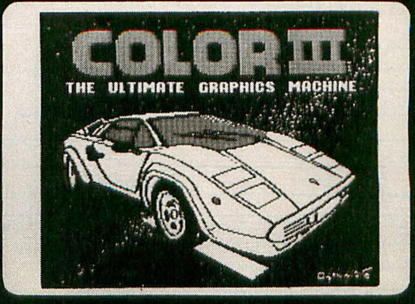
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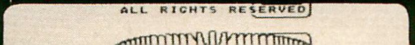
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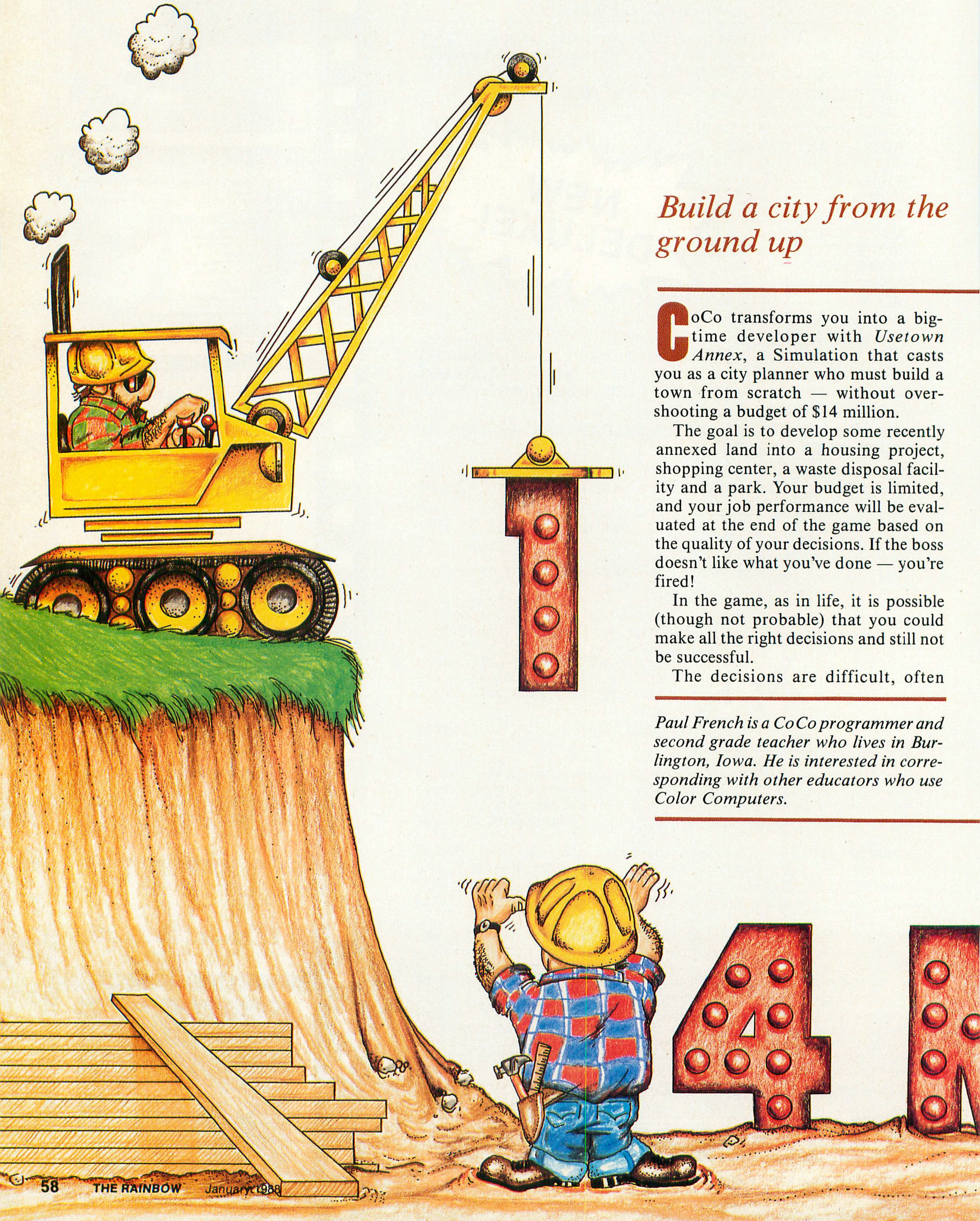


# *Build a city from the ground up*

CoCo transforms you into a big-time developer with *Usetown Annex*, a Simulation that casts you as a city planner who must build a town from scratch — without overshooting a budget of $14 million.

The goal is to develop some recently annexed land into a housing project, shopping center, a waste disposal facility and a park. Your budget is limited, and your job performance will be evaluated at the end of the game based on the quality of your decisions. If the boss doesn't like what you've done — you're fired!

In the game, as in life, it is possible (though not probable) that you could make all the right decisions and still not be successful.

The decisions are difficult, often

---

*Paul French is a CoCo programmer and second grade teacher who lives in Burlington, Iowa. He is interested in corresponding with other educators who use Color Computers.*

# Usetown Annex

### By Paul French

forcing you to choose between cost-effectiveness and environmental protection: Will you employ expensive soil conservation techniques or cut costs? Will you spend tens of thousands of dollars to preserve trees and endangered species? Will you pay almost $100,000 for a device to control emissions from a waste facility's incinerator? Will you provide facilities for the handicapped? You must use responsibility in answering these questions while always keeping in mind that your job is on the line.

*Usetown Annex* employs graphics, memos and news flashes to increase its realism. It was inspired by the Iowa 4H program, *Useburg Annex*, which was developed for Apple computers. *Usetown* runs on a 32K Color Computer with Extended Color BASIC, and shares absolutely no coding with the Apple program that inspired it.

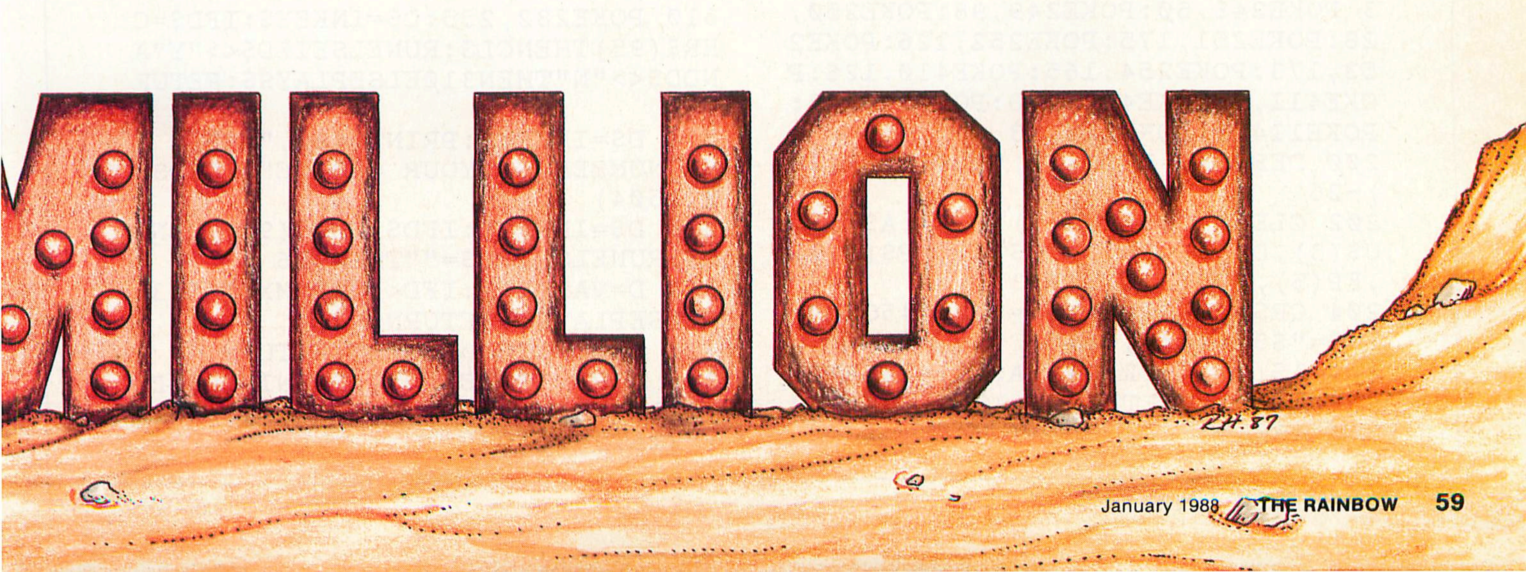
Since I intended to use the game with children in classrooms, I included the following features:

- Easy-to-read screens.
- Disabled BREAK and CLEAR keys to prevent disruption of the game.
- Consistent keyboard response. The game always responds to one keystroke with no requirement to press ENTER. Only appropriate keys will respond, and the program is protected from someone changing the CoCo to lowercase (by pressing SHIFT-0), which could interfere with recognition of a pressed key.
- Directions are presented at the bottom of the screen. Unless your CoCo has true lowercase instead of green on black lowercase characters, the directions will be in inverse video.
- User-controlled program pace. Delays caused by the program were held to a minimum.
- A way to restart the game without playing it to its conclusion. Press shifted up arrow when the program prompts for Y (Yes) or N (No) to restart the game. (I added this feature when I found that students were having to leave the game unfinished at the end of a class period and the new students coming in wanted to start their own games.)

The graphics were added after the text portion of the game was completed. They were kept relatively simple to minimize delays and to keep the program within memory limitations.

Programming style suffered a bit because I used multi-statement lines to conserve memory where I could. Variable names were reused to minimize the memory devoted to variable storage. Most of the options selected during development are recorded in the variable `OT` as individual bits. Despite its looks, there is structure to the program.

In order to present the directions at the bottom of the screen in inverse video, I wrote `RVSLINE`, the short BASIC program shown in Listing 1. I am not an assembly language programmer, but the inverse video is achieved by replacing `RVSLINE`'s last line with the machine language program when it is run, and



then attaching the machine language program to the end of USETOWN. Complete instructions regarding how to do this are as follows:

1) Type in RVSLINE exactly as it appears and save a copy *before* you run it.
2) Run the program. (If you list the program after running it, all that should show up is Line 70. Line 80 was replaced by the machine language program, which you can't see, and the other lines were deleted.)
3) Do *not* type NEW and do not delete Line 70 yet. If you do, you will lose the machine language program that is attached to the end of the BASIC program. Instead, start typing in Listing 2, USETOWN. After you have typed in at least one line of USETOWN, you may delete Line 70 (type DEL70). The machine language program will stay attached to the end of USETOWN when you save or load it and as you finish typing it in. Do *not* save the program in ASCII format or the machine language portion will be lost.

You can also use RVSLINE with other programs. Follow the same steps, except type in the program you want to achieve inverse video on after running RVSLINE. And near the beginning of your program, insert the following line from Line 200 of USETOWN:

```
DEFUSR9 = PEEK(27) * 256 +
  PEEK(28) - 26
```

When you want to reverse a line on the screen, PRINT the line, then place D = USR9(*xxxx*) in your program. The *xxxx* should be replaced with the memory address of the first character of the line you want to reverse — 1024 for the first line, 1056 for the second line, etc. (An example is shown in Line 308 of USETOWN.)

**Listing 1:** RVSLINE

```
10 DATA00,00,00,00,BD,B3,ED,1F,0
1,C3,00,20,DD,00,A6,84,80,40,A7,
80,9C,00,26,F6,39
20 AD=PEEK(27)*256+PEEK(28)
30 FOR N=AD-28 TO AD-4
40 READ ML$
50 POKE N,VAL("&H"+ML$)
60 NEXT
65 DEL 10-65
70 'ML PROGRAM ATTACHED TO
   END OF BASIC
80 REMABCDEFGHIJKLMNOPQRST
```

I hope you enjoy *Usetown Annex*, learn something about the responsibility and strategy of decision-making, and keep your job as city planner.

---

*(Questions or comments regarding this program may be directed to the author at 310 N. Gertrude, Burlington, IA 52601. Please enclose an SASE when writing for a response.)* ☐

*Editor's Note:* RVSLINE, *the machine language program will already be embedded into the* USETOWN *program on this month's* RAINBOW ON TAPE *and* RAINBOW ON DISK.

| | | | |
|---|---|---|---|
| 340 | 235 | 1864 | 58 |
| 1032 | 146 | 2010 | 122 |
| 1102 | 192 | 3020 | 6 |
| 1192 | 121 | 3045 | 64 |
| 1352 | 201 | 3226 | 236 |
| 1357 | 59 | 3555 | 100 |
| 1424 | 212 | END | 251 |
| 1709 | 137 | | |

**Listing 2:** USETOWN

```
0 GOTO63999
1 GOTO3
2 PCLEAR4:GOTO1
3 POKE248,50:POKE249,98:POKE250,
28:POKE251,175:POKE252,126:POKE2
53,173:POKE254,165:POKE410,126:P
OKE411,0:POKE412,248:POKE113,87:
POKE114,2:POKE115,93
200 DEFUSR9=PEEK(27)*256+PEEK(28
)-26
202 CLEAR450:DIMA(3),C(3),A$(3),
U$(3),D$(3),P$(3),C$(3),FP$(5,1)
,FP(5),SP$(3,1),SP(3)
204 CR$=CHR$(13):S$="V15T45O5B":
FM$="$$######,###"
206 A$(0)="FOREST":A$(1)="FARMLA
ND":A$(2)="WETLAND":A$(3)="AN UR
BAN AREA"
208 C$(0)="$150,000":C$(1)="$200
,000":C$(2)="$60,000":C$(3)="$30
0,000":C(0)=150000:C(1)=200000:C
(2)=60000:C(3)=300000
210 U$(0)="GRAZING OR PARK AREA.
":U$(1)="GRAZING OR GROWING CROP
S.":U$(2)="FARMING OR A NATURAL
AREA          PARK.":U$(3)="FACTORI
ES AND STORES."
212 P$(0)="HOUSING DEVELOPMENT":
P$(1)="SHOPPING CENTER":P$(2)="P
ARK":P$(3)="WASTE FACILITY"
220 D=RND(-TIMER)
298 GOTO1000
300 D$=INKEY$:PRINT@482,"PRESS A
NY KEY TO CONTINUE...";:D=USR9(1
504)
304 IF INKEY$=""THEN304ELSEPLAYS
$:CLS:RETURN
308 D$=INKEY$:PRINT@481,"PRESS
Y  FOR YES,  N  FOR NO";:D=USR9(
1504)
310 POKE282,255:D$=INKEY$:IFD$=C
HR$(95)THENCLS:RUNELSEIFD$<>"Y"A
NDD$<>"N"THEN310ELSEPLAYS$:RETUR
N
314 D$=INKEY$:PRINT@480,"PRESS T
HE NUMBER OF YOUR CHOICE";:D=USR
9(1504)
316 D$=INKEY$:IFD$=CHR$(95)THENC
LS:RUNELSEIFD$=""THEN316
318 D=VAL(D$):IFD<1ORD>MX THEN31
6ELSEPLAYS$:RETURN
320 FORD=1TO600:NEXT:RETURN
340 FORD=1TOLEN(D$):PRINTMID$(D$
,D,1);:IFMID$(D$,D,1)>" "THENPLA
Y"V15T25O2D"
```

```
342 FORDE=1TO3:NEXTDE,D:RETURN
1000 CLS:PRINTSTRING$(32,42);:PR
INT@72,"WELCOME TO THE":PRINT@13
7,"USETOWN ANNEX":PRINT@204,"PRO
JECT":PRINT@256,STRING$(32,42);:
PRINT@268,"V. 2.01";:PRINT@289,"
COPR. (C) 1985  BY PAUL FRENCH":
GOSUB3000
1002 PRINT@387,"WOULD YOU LIKE D
IRECTIONS?":GOSUB308:IFD$="Y"GOS
UB4000
1005 SCREEN1,0:GOSUB304
1006 PC=0:FF=0:MX=0:FORD=0TO3:D$
(D)="":NEXTD:FORD=0TO3:IFA$(D)>"
"THEND$(MX)=A$(D):MX=MX+1
1008 NEXTD
1010 CLS:PRINT@35,"WHICH AREA WO
ULD YOU LIKE     TO DEVELOP?":PR
INT:FORD=1TOMX:PRINTTAB(6);STR$(
D);") ";D$(D-1):NEXTD
1012 GOSUB314:FORDE=0TO3:IFA$(DE
)=D$(D-1)THENA=DE:NEXT:ELSENEXT
1016 D$=" TO:  CITY PLANNER"+CR$
+" FROM:  CITY ASSESSOR"+CR$+" S
UBJECT:  COST OF LAND"+CR$+CR$+"
  THE COST OF THE ":IFA<3THEND$
=D$+A$(A)ELSED$=D$+RIGHT$(A$(A),
10)
1018 GOSUB2030:PRINT:D$=" IS "+C
$(A)+".":GOSUB340:GOSUB300
1019 PC=PC+C(A)
1020 CLS:PRINT:PRINT"  YOU SHOU
LD LOOK AT THE      ZONING COD
E (WHICH TELLS HOW  THE LAND M
AY BE USED) BEFORE  DECIDING H
OW TO DEVELOP ";:IFA<3THENPRINT"
THE "ELSEPRINT" "
1022 PRINT" "A$(A)".":GOSUB300
1023 CLS:PRINT"********* ZONING
CODE *********":PRINT"  IN USE
TOWN, ";A$(A):PRINT" MAY BE USED
 EXCLUSIVELY FOR":PRINT" "U$(A)
1024 PRINT:PRINT"  ALL OTHER US
ES ARE STRICTLY  AGAINST THE LA
W.  A ZONING     VARIANCE (PERM
ISSION TO USE    THE LAND FOR O
THER PURPOSES)   MUST BE OBTAIN
ED TO USE THE    LAND FOR ANY P
URPOSE BESIDES"
1025 PRINT" "U$(A):GOSUB300
1026 MX=0:FORD=0TO3:D$(D)="":NEX
TD:FORD=0TO3:IFP$(D)>""THEND$(MX
)=P$(D):MX=MX+1
1028 NEXTD
1030 CLS:PRINT@34,"WHAT ARE YOU
GOING TO DEVELOP  IN THE ";:IFA=
3THENPRINTRIGHT$(A$(A),10);:ELSE
PRINTA$(A);
1032 PRINT"?":PRINT:FORD=1TOMX:P
RINTTAB(6);STR$(D);") ";D$(D-1):
NEXTD
```

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Woodhaven, NY 11421
(718) 296-2385

```
1034 GOSUB314:FORDE=0TO3:IFP$(DE
)=D$(D-1)THENP=DE:NEXT:ELSENEXT
1038 IFA=2ANDP=2GOSUB2010
1050 IFA=2ANDP=2ANDO1=2ORA=0ANDP
=2ORA=3ANDP=1THEN1100
1052 CLS:PRINT:PRINT"   GETTING
A ZONING VARIANCE     WON'T BE E
ASY.  CHANCES OF      GETTING TH
E VARIANCE APPROVED   MIGHT BE B
ETTER IF YOU HIRE A   LAWYER.":P
RINT:PRINT"   DO YOU WISH TO HIR
E ONE?":GOSUB308
1054 L$=D$:IFL$="N"THEN1070
1056 CLS:PRINT@35,"LAWYERS NEED
TIME TO PREPARE  THEIR ARGUMENTS
.  YOUR HEARING  HAS BEEN DELAYE
D TWO WEEKS.":PRINT:GOSUB2014:GO
SUB300
1070 CLS:PRINT@36,"PROPOSAL - TO
 PERMIT A":PRINT"  ZONING VARIAN
CE SO THE":PRINT"  ";:IFA=3THENP
RINTRIGHT$(A$(A),10);ELSEPRINTA$
(A);
1072 PRINT" MAY BE DEVELOPED":PR
INT"  AS A ";:IFA=2ANDP=2THENPRI
NT"SPORTS RECREATION AREA."ELSEP
RINTP$(P)"."
1074 FORDE=1TO4:GOSUB320:NEXT
1076 DATAWARREN PEASE,MARY LEE,R
OBERT BARON,SOL LIGHT,FOREST H.
GRUPE
1078 PRINT@194,"BOARD MEMBERS":P
RINT@218,"VOTE":PRINT@226,STRING
$(28,45):FORDE=258TO386STEP32:RE
ADD$:PRINT@DE,D$:NEXT:GOSUB320:R
ESTORE
1080 V=0:FORDE=282TO410STEP32:GO
SUB320:D=RND(5):PRINT@DE,;:IFL$=
"Y"ANDD>2ORD>3THENV=V+1:PRINT"YE
S"ELSEPRINT" NO"
1082 NEXT:GOSUB320:PRINT:PRINT"
 RESULTS:  VARIANCE ";:IFV<3THEN
PRINT"FAILS."ELSEPRINT"PASSES."
1083 IFV<3THENFF=1:FP=FP+1
1084 GOSUB300
1086 IFL$="N"THEN1092ELSECLS:PRI
NT@33,"DEAR CITY PLANNER,":PRINT
:PRINT"   OUR BILL FOR LEGAL SER
VICES   IN THE USETOWN ANNEX ZON
ING     HEARING COMES TO";:DE=RN
D(15)*1000+10000:PRINTUSING"$$##
,###.";DE
1088 PRINT:PRINT"   IT HAS BEEN
A PLEASURE TO       SERVE YOU.":PC
=PC+DE
1090 PRINT:PRINTTAB(13);"WILSON
& WILSON":PRINTTAB(16);"(LAWYERS
)":GOSUB300
1092 IFFF<>0THEN1700
1100 IFA<>2THEN1110
1102 CLS:PRINT@35,"IT WOULD COST
 $200,000 TO      FILL AND LEVEL
THE WETLAND TO    ENSURE PROPER B
UILDING           CONDITIONS.  DO
 YOU WISH TO      SPEND THE MONEY
?":GOSUB308
1104 IFD$="Y"THENPC=PC+200000:OT
=OT OR1
1106 CLS:PRINT@35,"FLOOD CONTROL
 CONSTRUCTION     WOULD COST $300
,000.  DO YOU     WISH TO SPEND T
HE MONEY FOR      FLOOD CONTROL?"
:GOSUB308
1108 IFD$="Y"THENPC=PC+300000:OT
=OT OR2
1110 IFP<>0THEN1130
1112 CLS:PRINT@35,"WHICH TYPE OF
 HOUSING          WOULD YOU PREFE
R TO BUILD?":PRINT@131,"1) TWELV
E SINGLE FAMILY          HOMES
 FOR $780,000":PRINT@227,"2) THR
EE MULTI-FAMILY UNITS        (12
 HOMES) FOR $540,000":MX=2:GOSUB
314
1114 IFD=2THENPC=PC+540000:OT=OT
 OR4ELSEPC=PC+780000
1130 IFP<>1THEN1160
1132 CLS:PRINT@35,"YOU CAN BUILD
":PRINT:PRINT"   1) A LARGE SHOP
PING CENTER":PRINTTAB(6)"FOR $6,
000,000 WHICH WILL        PROVIDE
 MORE JOBS AND":PRINTTAB(6)"INCO
ME, OR"
1134 PRINT:PRINT"   2) A SMALLER
 ONE FOR":PRINTTAB(6)"$3,500,000
.":MX=2:GOSUB314
1136 IFD=1THENPC=PC+6000000:OT=O
T OR8ELSEPC=PC+3500000
1160 IFP<>2THEN1190
1161 IFA<>2THENGOSUB2010
1162 CLS:PRINT@35,"PARK FACILITI
ES WITH CONVEN-   TIONAL HEATING,
 COOLING, AND     LIGHTING WILL C
OST $90,000.":PRINT:PRINT"   SOL
AR FACILITIES MIGHT HELP   KEEP
UTILITY BILLS DOWN IN THE   FUTUR
E.  DO YOU WANT TO SPEND"
1164 PRINT" $40,000 FOR SUPPLEME
NTAL SOLAR   FACILITIES?":GOSUB30
8:PC=PC+90000
1166 IFD$="Y"THENPC=PC+40000:OT=
OT OR16
1190 IFP<>3THEN1220
1192 CLS:PRINT@35,"YOU CAN BUILD
":PRINT:PRINT"   1) A LANDFILL F
OR":PRINTTAB(6)"$2,500,000, OR":
PRINT:PRINT"   2) A WASTE RECYCL
ING CENTER          FOR $4,500,000
```

```
.":MX=2:GOSUB314
1193 IFA<>2ORD<>1THEN1195ELSECLS
:PRINT@35,"EVEN WITH THE VARIANC
E YOU    WILL NOT BE ALLOWED TO
BUILD A  LANDFILL IN THE WETLAND
.  DO    YOU WANT TO":PRINT:PRIN
T"    1) CANCEL THIS DEVELOPMENT,
        OR":PRINT:PRINT"    2) BU
ILD A RECYCLING PLANT?"
1194 MX=2:GOSUB314:OT=OT OR2048:
IFD=1THENFF=1:FP=FP+1:GOTO1700
1195 IFD=1THENPC=PC+2500000:OT=O
T OR32ELSEPC=PC+4500000
1198 IFOT AND32THEN1220ELSEGOSUB
2020:IFD$="Y"THENPC=PC+80000:OT=
OT OR512
1220 IFA<>0THEN1350
1222 CLS:PRINT@35,"USING SPECIAL
 CONSTRUCTION    METHODS WOULD A
LLOW YOU TO      SAVE MANY OF TH
E TREES AT A     COST OF $80,000
.  DO YOU WANT   TO SAVE THE TRE
ES?":GOSUB308
1224 IFD$="Y"THENPC=PC+80000:OT=
OT OR64
1350 IFP=3THEN1362
1352 CLS:PRINT@35,"PROVISIONS FO
R HANDICAPPED    ACCESS WOULD AD
D ";:PRINTUSING"$$##,###";(.02*P
C):PRINT" TO THE COST.  WILL YOU
 PROVIDE  HANDICAPPED ACCESS?":G
OSUB308
1353 IFD$="Y"THENOT=OT OR128:PC=
PC+(.02*PC):GOTO1362ELSEIFRND(10
)>8THEN1362
1354 CLS:PRINT@35,"THE STATE COM
MISSION ON THE   HANDICAPPED HAS
 REQUESTED YOU   TO APPEAR WITH
YOUR LAWYER SO   THAT THEY CAN E
XPLAIN THE       FINER POINTS OF
 THE STATE       HANDICAPPED ACC
ESS LAW TO YOU."
1355 GOSUB300:CLS:PRINT@35,"THE
FINER POINTS INDICATE    THAT Y
OU DON'T HAVE A CHOICE.   YOU WI
LL PROVIDE HANDICAPPED    ACCESS
 AT A COST OF ";:PRINTUSING"$$##
,###.";(.02*PC):PC=PC+(.02*PC):G
OSUB300
1356 CLS:PRINT@33,"DEAR CITY PLA
NNER,":PRINT:PRINT"   OUR BILL F
OR LEGAL SERVICES   IN THE HANDI
CAPPED ACCESS       MATTER COMES
 TO ";:DE=RND(5)*1000+10000:PRIN
TUSING"$$#,###.";DE:PRINT:PRINT"
   IT HAS BEEN A PLEASURE TO
 SERVE YOU.":PC=PC+DE
1357 PRINT:PRINTTAB(13)"WILSON &
 WILSON":PRINTTAB(16)"(LAWYERS)"
:GOSUB300
```

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```
1362 DE=RND(5)*1000+4000:CLS:PRI
NT@35,"WILL YOU PAY ";:PRINTUSIN
G"$$,###";DE;:PRINT" TO":PRINT"
CONSERVE AS MUCH SOIL AS
POSSIBLE DURING CONSTRUCTION?":G
OSUB308:IFD$="Y"THENPC=PC+DE:OT=
OT OR256
1372 D$=" TO:  CITY PLANNER"+CR$
+" FROM:  ACE CONSTRUCTION CO."+
CR$+" SUBJECT:  PROJECT CONSTRUC
TION"+CR$+CR$+"     CONSTRUCTION
HAS BEGUN"+CR$+" IN THE ":GOSUB2
050
1383 IFA=0THENDE=4000
1384 IFA=1THENDE=1250
1385 IFA=2AND(OT AND1)THEN1402EL
SEIFA=2THENDE=20000
1386 IFA=3AND(OT AND32)THENDE=97
000ELSEIFA=3THENDE=48000
1389 CLS:PRINT@35,"CLEARING THE
AREA FOR          CONSTRUCTION CO
STS ";:PRINTUSING"$$#,###.";DE:P
C=PC+DE:GOSUB300
1402 IFA=0ORA=2THENCLS:PRINT@35,
"CONSTRUCTION IS DELAYED       W
HILE AN ENVIRONMENTAL IMPACT    S
TUDY IS CONDUCTED.":PRINT:GOSUB2
014:GOSUB300ELSEGOTO1422
1404 IFRND(10)>5THEN1422ELSECLS:
PRINT@35,"AN ENDANGERED SPECIES
WAS       FOUND AND CONSTRUCTION W
ILL       NOT CONTINUE UNTIL
          CONSTRUCTION METHODS ARE
          APPROVED WHICH WILL PROT
ECT       THE ENDANGERED SPECIES."
:PRINT:GOSUB2014
1406 GOSUB300:DE=PC*.05:CLS:PRIN
T@35,"CONSTRUCTION MAY CONTINUE,
    BUT PROTECTING THE ENDANGERE
D   SPECIES INCREASES YOUR COSTS
    BY ";:PRINTUSING"$$##,###.";
DE:PC=PC+DE:GOSUB300
1422 DU=RND(10)*10:D$="USETOWN W
EATHER REPORT"+CR$+CR$:IFDU<60TH
END$=D$+" MOSTLY SUNNY.":GOSUB20
40:GOTO1432ELSED$=D$+" CLOUDY WI
TH A"+STR$((DU-55)*2)+"% CHANCE
OF"+CR$+" RAIN.":GOSUB2040:D=RND
(10)*10
1423 IFD>(DU-55)*2THEND$="USETOW
N WEATHER UPDATE"+CR$+CR$+" WE H
AVE CLOUDY SKIES - NO"+CR$+" RAI
N.":GOSUB2040:GOTO1432
1424 D$="USETOWN WEATHER UPDATE"
+CR$+CR$+" WE CURRENTLY HAVE HEA
VY RAINS"+CR$+" IN USETOWN...":G
OSUB2040:CLS:PRINT@35,"CONSTRUCT
ION IS HALTED BY    THE RAIN."+
CR$:GOSUB2014:GOSUB300
1426 IFOT AND256THEN1428ELSED$="
 TO:  CITY PLANNER"+CR$+" FROM:
 STATE E.P.A."+CR$+" SUBJECT:  S
OIL EROSION"+CR$+CR$+"  YOU ARE
 FINED $40,000 FOR    FAILING T
O PREVENT SOIL       EROSION."
:PC=PC+40000:GOSUB2030:GOSUB300
1428 IFA<>2THEN1452ELSEIFOT AND2
THEN1432ELSED$="USETOWN WEATHER
UPDATE"+CR$+CR$+" RAINS CAUSE FL
OODING IN"+CR$+" WETLAND.  CONST
RUCTION PROJECT"+CR$+" DESTROYED
.":GOSUB2040:FF=1:FP=FP+1:GOTO17
00
1432 IFA<>2THEN1452ELSEIFOT AND1
THEN1452ELSEPC=PC*2:PRINT@35,"PR
OBLEMS ENCOUNTERED WHILE     TRYI
NG TO BUILD ON MARSHY LAND   DOUB
LE THE COST OF THIS          PROJ
ECT TO ";:PRINTUSING"$$#####,###
.";PC:GOSUB300
1452 CLS:PRINT@35,"CONSTRUCTION
IS IN ITS FINAL   STAGES.  WILL Y
OU LANDSCAPE AT  A COST OF ";:PR
INTUSING"$$###,##.";PC*.04:GOSUB
308:IFD$="Y"THENPC=PC+PC*.04:OT=
OT OR1024
1462 D$=" TO:  CITY PLANNER"+CR$
+" FROM:  ACE CONSTRUCTION CO."+
CR$+" SUBJECT:  PROJECT CONSTRUC
TION"+CR$+CR$+"     CONSTRUCTION
IS COMPLETE"+CR$+" IN THE ":GOSU
B2050
1472 IFP<3OR(OT AND512)OR(OT AND
32)THEN1482ELSECLS:PRINT@35,"THE
 STATE E.P.A. WILL NOT     ALLOW
 THE RECYCLING PLANT TO    OPEN
UNTIL STACK EMISSIONS     ARE C
ONTROLLED."+CR$:GOSUB2014:GOSUB3
00:GOSUB2020:IFD$="N"THEN1472ELS
EPC=PC+80000
1482 IFA=2ANDP<>2THENCLS:PRINT@3
5,"SEEPAGE AND SETTLING HAS
 RESULTED IN A PENALTY TO YOU
 OF ";:PRINTUSING"$$####,###.";P
C*.1:PC=PC+PC*.1:GOSUB300
1492 IFOT AND256THENDE=153:D$="S
OIL CONSERVATION":DU$="WORKING T
O SAVE SOIL":GOSUB2070
1494 IFOT AND512THENDE=169:D$="C
LEAN AIR":DU$="KEEPING OUR AIR C
LEAN":GOSUB2070
1496 IFOT AND1024THENDE=185:D$="
CITY BEAUTIFUL":DU$="BEAUTIFUL P
LANTINGS":GOSUB2070
1498 IFOT AND16THENDE=249:D$="EN
ERGY EFFICIENCY":DU$="HELPING CO
NSERVE RESOURCES":GOSUB2070
1700 IFP=1ANDA=2THENBR=BR-2
1703 IFP=1ANDA=0THENBR=BR-1
1706 IFOT AND2048THENBR=BR-2
1709 IFP=3ANDA=3AND(OT AND32)THE
NBR=BR-2
```

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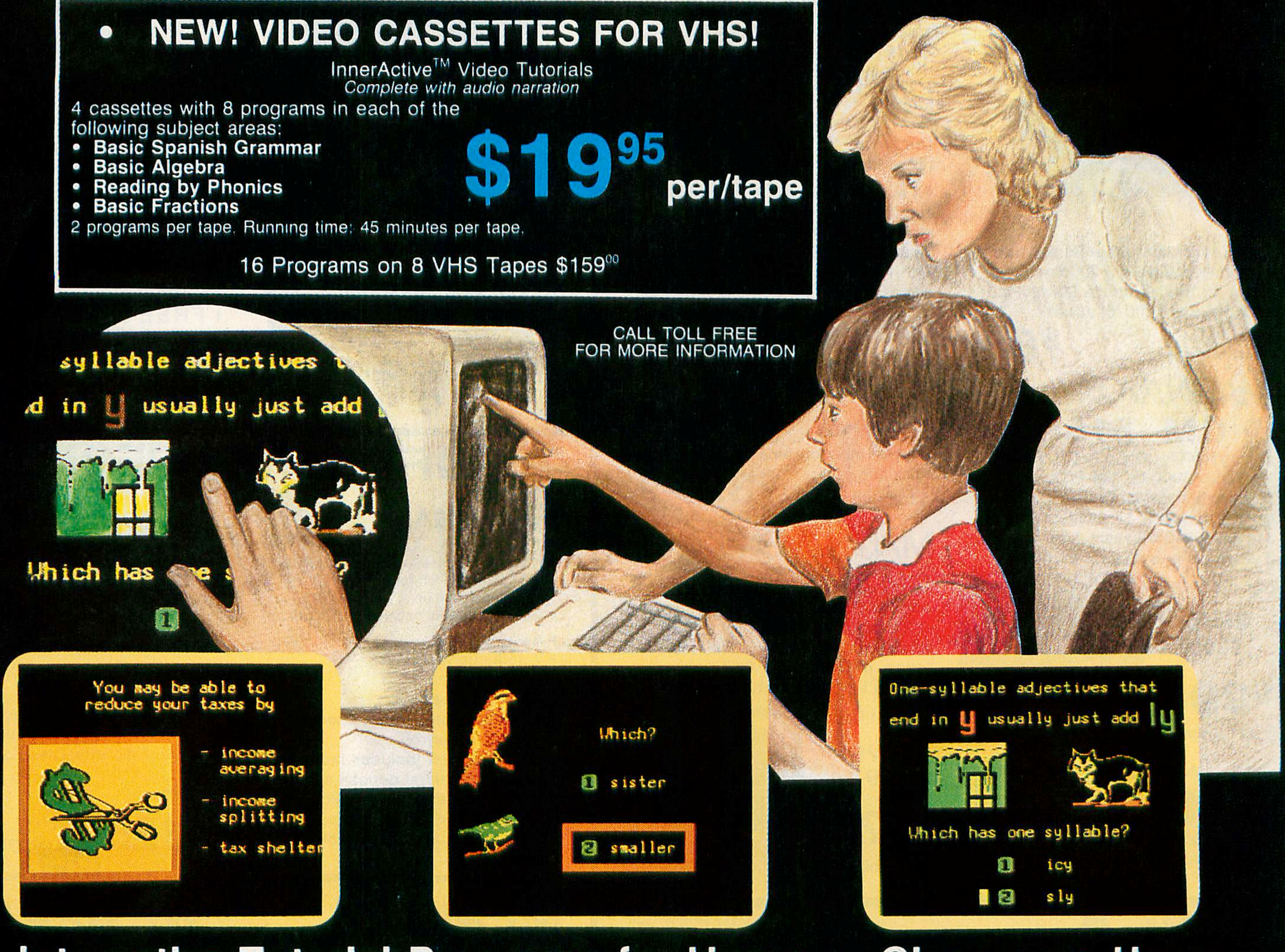

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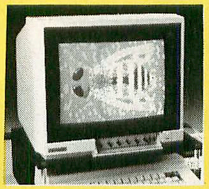

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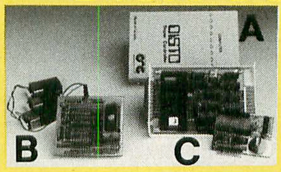
## DISK CONTROLLER



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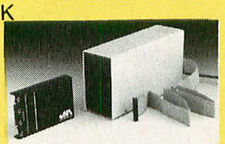

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```
1710 IFFF>0THENBR=BR-1:GOTO1760
1712 IFP=2ANDA=2ANDO1=2THENBR=BR
+5
1715 IFP=3ANDA=1THENBR=BR+5
1718 IFP=0ANDA=0THENBR=BR+5
1721 IFP=1ANDA=3THENBR=BR+5
1724 IFOT AND1THENBR=BR+1
1727 IFOT AND2THENBR=BR+1
1730 IFOT AND4THENBR=BR+1
1733 IFOT AND8THENBR=BR+1
1736 IFOT AND16THENBR=BR+1
1739 IFOT AND32THEN1742ELSEIFP=3
THENBR=BR+1
1742 IFOT AND64THENBR=BR+1
1745 IFOT AND128THENBR=BR+1
1748 IFOT AND256THENBR=BR+1
1751 IFOT AND512THENBR=BR+1
1754 IFOT AND1024THENBR=BR+1
1760 IFFF=1THENSCREEN1,0:GOSUB30
4ELSEGOSUB3100
1770 OT=0:O1=0
1800 IFA=3THEND$=MID$(A$(A),4,5)
ELSED$=A$(A)
1801 IFP=0ORP=1THENDU$=LEFT$(P$(
P),8)ELSEIFP=3THENDU$=LEFT$(P$(P
),6)ELSEDU$=P$(P)
1802 IFFF=1THENFP$(FP-1,0)=D$:FP
$(FP-1,1)=DU$:FP(FP-1)=PC:GOTO18
06ELSESP=SP+1:SP$(SP-1,0)=D$:SP$
(SP-1,1)=DU$:SP(SP-1)=PC:A$(A)="
":P$(P)=""
1806 IFFP=0THEN1856
1808 CLS:PRINT@5,"USETOWN PROJEC
T REPORT":PRINTSTRING$(32,61);:P
RINT"INCOMPLETE PROJECTS:":PRINT
"region    project     cost"
1810 IC=0:FORD=0TOFP-1:PRINTFP$(
D,0);TAB(10)FP$(D,1);TAB(20);:PR
INTUSINGFM$;FP(D);:IC=IC+FP(D):N
EXT
1812 PRINT@320,STRING$(32,61);:P
RINT@352,"TOTAL COST OF":PRINT@3
84,"INCOMPLETE PROJECTS:";:PRINT
USINGFM$;IC
1814 PRINT@448,"PRESS ANY KEY TO
 VIEW":D=USR9(1472):PRINT@480,"T
HE NEXT PAGE OF THIS REPORT...";
:D=USR9(1504):GOSUB304
1856 CLS:PRINT@5,"USETOWN PROJEC
T REPORT":PRINTSTRING$(32,61);:P
RINT"COMPLETED PROJECTS:":PRINT"
region    project     cost"
1857 IFSP=0THEN1862
1858 RT=0:FORD=0TOSP-1:PRINTSP$(
D,0);TAB(10)SP$(D,1);TAB(20);:PR
INTUSINGFM$;SP(D);:RT=RT+SP(D):N
EXT
1862 PRINT@256,STRING$(20,61):PR
```

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```
INT@288,"INCOMPLETE PROJECTS:";:
PRINTUSINGFM$;IC
1864 PRINT@340,STRING$(12,45);:P
RINT@361,"TOTAL COST:";:PRINTUSI
NGFM$;IC+RT
1866 PRINT@396,"BALANCE:";:PRINT
USINGFM$;1400000-(IC+RT)
1867 IFFP=0GOSUB300:GOTO1872
1868 PRINT@448,"PRESS  P  TO VIE
W PREVIOUS PAGE,";:D=USR9(1472):
PRINT@480,"  ANY OTHER KEY TO CO
NTINUE...";:D=USR9(1504)
1870 POKE282,255:D$=INKEY$:IFD$=
""THEN1870ELSEIFD$=CHR$(95)THENC
LS:RUNELSEIFD$="P"THENPLAYS$:GOT
O1806ELSEPLAYS$
1872 IF1400000-(IC+RT)<0THEN192
0ELSEIFFP=6THEN1930ELSEIFSP<4THE
N1006
1910 CLS:PRINT@37,"YOU HAVE DEVE
LOPED ALL        FOUR AREAS IN T
HE USETOWN       ANNEX.  WE RATE
 YOUR JOB        PERFORMANCE:":P
RINT:FORDE=1TO3000:NEXT
1911 PRINTTAB(9)"EXCELLENT":PRIN
TTAB(14)"GOOD":PRINTTAB(11)"AVER
AGE":PRINTTAB(14)"FAIR":PRINTTAB
(14)"POOR"
1915 GOSUB320:SOUND89,1:PRINT@34
0,"*";:IFBR>9THENGOSUB320:PRINT@
340," ";:SOUND125,1:PRINT@308,"*
";:IFBR>18THENGOSUB320:PRINT@308
," ";:SOUND147,1:PRINT@276,"*";
1916 IFBR>27THENGOSUB320:PRINT@2
76," ";:SOUND176,1:PRINT@244,"*"
;:IFBR>35THENGOSUB320:PRINT@244,
" ";:SOUND189,1:SOUND193,1:PRINT
@212,"*";
1917 IFBR<19THENFORDE=1TO2000:NE
XT:PRINT@387,"YOUR SERVICES ARE
NO LONGER      REQUIRED.  YOU'RE
FIRED."
1918 GOSUB300:GOTO1950
1920 CLS:PRINT@35,"YOU OVERSPENT
 YOUR BUDGET.     IF YOU HAVE THE
 GOOD GRACE TO    SEEK OTHER EMPL
OYMENT, WE        WON'T HINDER YO
UR EFFORTS.       WILL YOU LOOK F
OR ANOTHER JOB?":GOSUB308:IFD$="
Y"THEN1950ELSE1940
1930 CLS:PRINT@35,"TOO MANY PROJ
ECTS HAVE         FAILED.":PRINT:
PRINT"  EVEN THOUGH IT IS NOT A
LL    YOUR FAULT, SOMEONE MUST
TAKE    RESPONSIBILITY.  DO YOU W
ISH     TO LOOK FOR A DIFFERENT J
OB?":GOSUB308:IFD$="Y"THEN1950
1940 PRINT@357,"SORRY - YOU'RE F
IRED!":GOSUB300
1950 CLS:PRINT@259,"DO YOU WANT
TO PLAY AGAIN?":GOSUB308:IFD$="Y
"THENRUN202ELSE1950
1999 END
2010 CLS:PRINT@66,"WHICH DO YOU
PLAN TO BUILD?":PRINT@131,"1. A
SPORTS RECREATION AREA":PRINT@16
3,"2. NATURAL AREA PARK":MX=2:GO
SUB314:O1=D:RETURN
2014 DE=RND(30)*1000+10000:PRINT
"   DELAYS COST MONEY.  THIS
  DELAY COSTS YOU";:PRINTUSING"$
$##,###.";DE:PC=PC+DE:RETURN
2020 CLS:PRINT@35,"DO YOU WISH T
O CONTROL THE    EMISSIONS FROM
THE INCINERATOR  AT A COST OF $8
0,000?":GOSUB308:RETURN
2030 CLS:PRINT@64,STRING$(32,35)
:PRINT@352,STRING$(32,35):PRINT@
96," ":GOSUB340:RETURN
2040 CLS:PRINT@96,STRING$(32,42)
:PRINT@320,STRING$(32,42):PRINT@
165,"";:GOSUB340:GOSUB300:RETURN
2050 IFA<3THEND$=D$+A$(A)+"."ELS
ED$=D$+RIGHT$(A$(A),10)+"."
2052 CLS:PRINT@64,STRING$(32,35)
:PRINT@352,STRING$(32,35):PRINT@
96," ":GOSUB340:GOSUB300:RETURN
2070 CLS:PRINTSTRING$(32,DE):FOR
D=32TO416STEP32:PRINT@D,CHR$(DE)
:PRINT@D+31,CHR$(DE);:NEXT:PRINT
@448,STRING$(32,DE);:PRINT@112-L
EN(D$)/2,D$;:PRINT@173,"AWARD";:
PRINT@202,STRING$(11,45);:PRINT@
292,"TO THE CITY PLANNER FOR";
2071 PRINT@368-LEN(DU$)/2,DU$;:G
OSUB300:RETURN
2100 END
3000 DIMG1(4),L$(27),G2(3),G4(3)
,G3(6)
3005 RQ$="NU5R3BU2U2R1D2BD2R3U4R
1D4R2NR4U4R5D4R3NU5E3U6G3L18E3R1
7U6H1U5L2D5G1D5R1U5R1NU4ND5R1D5"
3007 LQ$="R1E4F1E2NF3U1E2R2E1R2N
F2H1U1E1R1F3R1F1R1E1R2F3F2F1D1NF
3BD1BL1H1L2G1L1G1BE2BU1U1H1NE1L2
G4NL2BE2U1H1L1H1L1G2NF1H1L1G2BH6
R1BE3R1BE3BR6R1BF2BR3R1BF4R1"
3010 MQ$="NU7R=QQ;NR7U4R2ND3R2ND
3R2ND3R2D4R=QQ;NU7E7U8L=QQ;L8L=Q
Q;G7R1R=QR;D2NR21U7R2NR19BD2ND3F
2E2D3BR2U1NR2U1E1R1F1D2BR2NU3R2B
R2NU3R2BR2ND1NU4R2R=QR;E7"
3015 PQ$="NU3R6BU2U2R1D2BD2R2U4R
1D4R3NU4E5U3E1L1H1U6L1D5H1U1H1U1
G5L1NE5G1L3G5R3E1R1E1R1E1U1E2D1F
1D1F3E4"
3018 WI$="BU2U2BU4U2R1D2BD4D2BD2
R2":NQ$="NU11R2XWI$;XWI$;U4BU4U2
R1D2BD4D4R2XWI$;XWI$;NU11E3U10E1
L1H1L2H1L2H1L3G1L2G1L2G1L1G3R1E1
R2E1R2E1R3F1R2F1R2F1R1E2"
3020 PMODE3,1:PCLS4:DRAW"BM40,20
```

```
;C2U2L3U1E3E1D1F4L3":PAINT(40,16
),2,2:GET(35,11)-(46,21),G2,G
3021 PUT(3,19)-(14,29),G2,PSET:P
UT(27,3)-(38,13),G2,PSET:PUT(47,
25)-(58,35),G2,PSET:PUT(17,27)-(
28,37),G2,PSET:PUT(51,15)-(62,25
),G2,PSET:PUT(55,4)-(66,14),G2,P
SET:PUT(74,2)-(85,12),G2,PSET:PU
T(87,16)-(98,26),G2,PSET:PUT(41,
42)-(52,52),G2,PSET
3022 PUT(23,68)-(34,78),G2,PSET:
PUT(33,55)-(44,65),G2,PSET:PUT(6
7,65)-(78,75),G2,PSET:PUT(83,53)
-(94,63),G2,PSET:PUT(100,41)-(11
1,51),G2,PSET:PUT(3,50)-(14,60),
G2,PSET
3025 DRAW"BM11,15;U4L2H3U1E3R1E1
F1D1F3G3L1":PAINT(11,9),2,2:GET(
7,3)-(16,15),G4,G
3026 PUT(19,12)-(28,24),G4,PSET:
PUT(15,41)-(24,53),G4,PSET:PUT(3
5,29)-(44,41),G4,PSET:PUT(45,2)-
(54,14),G4,PSET:PUT(71,12)-(80,2
3),G4,PSET:PUT(93,4)-(102,15),G4
,PSET:PUT(111,16)-(120,27),G4,PS
ET
3027 PUT(19,55)-(28,67),G4,PSET:
PUT(7,67)-(16,78),G4,PSET:PUT(49
,61)-(58,72),G4,PSET:PUT(65,39)-
(74,50),G4,PSET:PUT(87,29)-(96,4
0),G4,PSET:PUT(97,66)-(106,77),G
4,PSET:PUT(89,124)-(98,135),G4,A
ND
3030 CIRCLE(165,36),14,3,.4:PAIN
T(163,35),3,3:CIRCLE(213,44),16,
3,.4:PAINT(221,45),3,3:DRAW"C3BM
180,36;R4F5R4F2":PMODE4,1
3035 COLOR 0,1:LINE(0,0)-(255,18
0),PSET,B:LINE(127,0)-(127,180),
PSET:LINE(0,90)-(255,90),PSET
3040 L$(1)="U3NR4U2E2F2D5":L$(2)
="U7R3F1D1G1NL2F1D2G1L3":L$(3)="
BR4BU1G1L2H1U5E1R2F1":L$(4)="U7R
3F1D5G1L3":L$(5)="NR4U4NR2U3R4":
L$(6)="U4NR3U3R4":L$(7)="BR4BU6H
1L2G1D5F1R3U3L1":L$(8)="U7D3R4NU
3D4":L$(9)="BR1R2L1U7NL1R1":L$(1
1)="U7D4NE4R1F3"
3041 L$(12)="NU7R4":L$(13)="U7F2
E2D7":L$(14)="U7F4ND3U4":L$(15)=
"U7R4D7L4":L$(16)="U7R3F1D2G1L2"
:L$(18)="U7R3F1D2G1L2F3":L$(19)=
"BU1F1R2E1U2H1L2H1U1E1R2F1":L$(2
0)="BR2U7L2R4":L$(21)="BU1NU6F1R
2E1U6":L$(22)="BU7D5F2E2U5"
3042 L$(23)="NU7E2F2U7":L$(25)="
BR2U3H2U2D2F2E2U2":L$(26)="BR1R1
":L$(0)="":L$(27)="BR1BU2E3"
```

*Two-Liner Contest Winner . . .*

Upon running *Frantic Fingers*, you will be prompted for the level at which you want to play. Enter a number from 1 to 400. Now, use the arrow keys to move around the screen and try to gather all the yellow blocks while avoiding the red ones. On a CoCo 3, you may need to enter `PALETTE RGB` before running.

**The listing:**

```
0 POKE65495,0:INPUTL:PMODE3,1:PC
LS:SCREEN1:LINE(0,0)-(255,191),P
SET,B:FORI=1TOL*3:COLOR4+2*(I<=L
),1:A=RND(60)*4:B=RND(45)*4:IFPP
OINT(A,B)=2THENI=I-1:NEXTELSELIN
E(A,B)-(A+3,B+3),PSET,BF:NEXT:X=
128:Y=96:S=0:Z=0
1 PRESET(X,Y):PSET(X,Y,4):A$=INK
EY$:Z=ASC(A$+CHR$(Z)):X=X+2*(Z=8
):X=X-2*(Z=9):Y=Y+(Z=94):Y=Y-(Z=
10):PM=PPOINT(X,Y):IFPM=2THENA=I
NT(X/4)*4:B=INT(Y/4)*4:LINE(A,B)
-(A+3,B+3),PRESET,BF:S=S+1:IFS=L
 THENPRINT"W":GOTO0ELSE1ELSEIF-P
M*(Z<>0)=4THEN0ELSE1
```

*Michael G. Toepke*
*Oak Harbor, WA*

(For this winning two-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape*.)

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```
3045 LINE(0,180)-(255,192),PSET,
BF:COLOR1,0:MS$="PRESS ANY KEY T
O CONTINUE...":MX=32:MY$="189":G
OSUB3990:COLOR0,1
3050 MS$="FARMLAND":MX=5:MY$="17
8":GOSUB3990:MS$="URBAN":MX=132:
MY$="178":GOSUB3990:MS$="WETLAND
":MX=132:MY$="88":GOSUB3990:MS$=
"FOREST":MX=5:MY$="88":GOSUB3990
3055 DRAW"BM99,126":DRAW"NU4R2BU
2U2R1D2BD2R2U4R1D4R2NU4E2U3NG1E1
H5G2NG5F4":GET(97,126)-(111,114)
,G1,G
3056 DRAW"BM78,121":DRAW"NU4R4NR
4U4R2BU4U1R1D1BD4R2D4R4NU4E3U3NG
2E1H1U2NL1NH3U7H1L2G1D3L1H1NG2L1
G4L1G3D1G1D1G1E1U1E1U1E3R1E1R1F1
R1F3D1F1D1F1"
3060 DRAW"BM175,150":DRAW"U18E1R
1E1F1R1F1R2F1D17L2NL6BU2U2BU4U2B
U4U2L1D2BD4D2BD4D2BD1BL3U3BU4U2B
U4U2L1D2BD4D2BD4D3BR8E1U17NG1L4"
:GET(175,130)-(186,150),G3,G:PUT
(184,129)-(195,149),G3,PSET:PUT(
193,132)-(204,152),G3,PSET
3099 RETURN
3100 CLS:PRINT@261,"ONE MOMENT P
LEASE . . .":IFA<>0THEN3140ELSEI
FOT AND64THEN3115ELSELINE(1,1)-(
126,80),PRESET,BF:GOTO3200
3115 IFP=3AND(OT AND32)GOTO3120E
LSEIFP=3ORO1=2THENLINE(76,27)-(1
14,53),PRESET,BF:GOTO3200
3120 LINE(12,27)-(114,53),PRESET
,BF
3125 IFP=1ORP=3THENLINE(1,50)-(1
26,80),PRESET,BF
3140 IFA<>1THEN3160ELSELINE(77,1
03)-(110,135),PRESET,BF
3160 IFA<>3THEN3200ELSELINE(175,
129)-(204,152),PRESET,BF
3200 IFA=0THENX=1:Y=1ELSEIFA=1TH
ENX=1:Y=91ELSEIFA=3THENX=128:Y=9
1
3205 DRAW"BM=X;,=Y;":IFP<>0THEN3
300ELSEIFOT AND4THEN3250ELSEIFA=
2THEN3225ELSEX=X+10:Y=Y+12:FORD=
1TO2:FORD1=0TO5:PUT(X+D1*18,10+Y
+15*D)-(X+D1*18+14,10+Y+15*D-12)
,G1,AND:NEXTD1:NEXTD
3215 IFOT AND1024THENX=X-7:Y=Y+2
3:FORD=1TO7:PUT(X,Y)-(X+9,Y+12),
G4,AND:X=X+18:NEXTD:GOTO3300ELSE
GOTO3300
3225 PUT(133,40)-(147,28),G1,AND
:PUT(234,48)-(248,36),G1,AND:PUT
(144,53)-(158,41),G1,AND:PUT(163
,55)-(177,43),G1,AND:PUT(182,58)
-(196,46),G1,AND:PUT(201,63)-(21
5,51),G1,AND:PUT(220,61)-(234,49
),G1,AND:PUT(150,29)-(164,17),G1
,AND
3226 PUT(169,28)-(183,16),G1,AND
:PUT(188,34)-(202,22),G1,AND:PUT
(207,33)-(221,21),G1,AND:PUT(226
,36)-(240,24),G1,AND
3230 IFOT AND1024THENX=128:Y=7:G
OTO3555ELSEGOTO3300
3250 IFA=2THEN3255ELSEDRAW"BM+15
,+43;XNQ$;BM+15,+21;XNQ$;BM+19,+
9;XNQ$;"
3252 IFOT AND1024THENFORD=0TO3:P
UT(X+D*36+3,Y+37)-(X+D*36+12,Y+4
9),G4,PSET:NEXTD:GOTO3300ELSEGOT
O3300
3255 DRAW"BM192,33;XNQ$;BM147,60
;XNQ$;BM213,68;XNQ$;"
3260 IFOT AND1024THENX=128:Y=9:G
OTO3555
3300 IFP<>1THEN3400
3305 IFOT AND8THENQQ=38:QR=30:DR
AW"BM+18,+45;"ELSEQQ=18:QR=10:DR
AW"BM+38,+45;"
3310 IFA=2THENDRAW"BM+128,+23;XM
Q$;":IFOT AND1024THENX=128:Y=9:G
OTO3555ELSE3400
3315 DRAW"XMQ$;"
3320 IFOT AND1024THEN3555
3400 IFP<2ORP>3THEN3700ELSEIFOT
AND32THEN3550ELSEIFA=0ORA=1THEND
RAW"BM+83,+48"ELSEIFA=2ANDP=2THE
NDRAW"BM+167,+60;"ELSEIFA=2ANDP=
3THENDRAW"BM+215,+30"ELSEIFA=3TH
ENDRAW"BM+46,+70"
3402 IFOT AND32THEN3550
3425 IFP=2THENDRAWPQ$ELSEIFP=3TH
ENDRAWRQ$
3430 IFOT AND1024THENX=PEEK(200)
:Y=PEEK(202)-2:PUT(X+5,Y)-(X+16,
Y+10),G2,PSET:GOTO3700ELSEGOTO37
00
3550 DRAW"BM+50,+50;XLQ$;"
3555 IFOT AND1024THENFORD=1TO6:P
UT(X+16*D,Y+60)-(X+16*D+11,Y+70)
,G2,PSET:NEXTD
3700 IFA=0THENMX=47:MY$="88"ELSE
IFA=1THENMX=61:MY$="178"ELSEIFA=
2THENMX=181:MY$="88":ELSEIFA=3TH
```

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```
ENMX=167:MY$="178"
3705 IFP=0THENMS$="/HOUSING"ELSE
IFP=1THENMS$="/SHOPPING"ELSEIFP=
2THENMS$="/PARK"ELSEIFP=3THENMS$
="/WASTE"
3710 GOSUB 3990
3900 SCREEN1,0
3901 GOSUB3004:X=0:Y=0:RETURN
3990 FORDU=1TOLEN(MS$):CH=ASC(MI
D$(MS$,DU,1))-64:IFCH=-18THENCH=
26ELSEIFCH=-17THENCH=27ELSEIFCH<
0ORCH>27THENCH=0
3991 DRAW"BM"+STR$(MX)+","+MY$+"
;XL$(CH);":MX=MX+7:NEXT DU:RETUR
N
4000 CLS:PRINT@35,"YOU ARE THE C
ITY PLANNER      FOR THE CITY OF
 USETOWN, IOWA.  YOUR CITY HAS R
ECENTLY ANNEXED, OR ADDED, A NEW
 PARCEL OF LAND  WHICH INCLUDES
FOREST, FARM-    LAND, WETLAND,
AND AN URBAN     RENEWAL AREA.":
PRINT
4002 PRINT"    YOU HAVE RECEIVED
A GOVERN-    MENT GRANT OF $14 MI
LLION        ($14,000,000) TO DEV
ELOP THIS    LAND.":GOSUB300
4004 PRINT@35,"YOUR JOB IS TO DE
VELOP        HOUSING, A PARK, A
SHOPPING     CENTER, AND A SOLID
 WASTE       DISPOSAL FACILITY."
:PRINT
4006 PRINT"    YOU HAVE ONLY $14
MILLION      TO WORK WITH. THE C
OST FOR      EACH TYPE OF DEVELOP
MENT WILL    DIFFER DEPENDING ON
WHERE YOU    WANT TO PUT IT.":GOS
UB300
4008 PRINT@35,"FOR EXAMPLE, BUIL
DING HOUSES   IN THE FOREST MIGHT
 NOT COST     THE SAME AS BUILDIN
G HOUSES      ON THE FARMLAND.":P
RINT:PRINT"    ONCE YOU BEGIN TO
DEVELOP      AN AREA THERE IS NO
TURNING      BACK.":PRINT
4010 PRINT"    TRY TO STAY WITHIN
 YOUR        BUDGET.  PLANNERS WH
O GO OVER    THEIR BUDGETS OFTEN
LOSE THEIR   JOBS.    GOOD LUCK!"
:GOSUB300:RETURN
63999 PMODE0:PCLEAR1:GOTO2
```

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R.A.D. Products Presents TEXTFORM

Finally, a versitile text formatter is available for the Color Computer. TEXTFORM is compatible with all models with at least 64K, even the Color Computer III. This machine language program will format ASCII text files into two column pages quickly and easily. Text may be left unmodified, or simply insert special formatter commands for added control. TEXTFORM is a versitile enhancement to any word processing system whether you are a casual or professional user.

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This is not another word processor. There are many fine word processors on the market for the Color Computer. TEXTFORM is a user defineable two column text formatter. If you are looking for a program which will allow your Color Computer to create professional looking documents without hours of tedious work, then TEXTFORM is the answer.

Ideal for:
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- Printer

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# NOVICES NICHE

THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

# Beginners Blockbuster

## Music

### From Scales to Mozart

16K
ECB

**By Gip Wayne Plaster**

Using four major loops and three PLAY statements, you can make one short program produce almost three minutes of music. That's what I did with MUS1. But that's not all I wanted to do. I wanted to improve the program and give you some pointers on music programming at the same time. Thus, MUS2 was born.

Notice that in MUS1 most of the lines are played at least twice. Here are some tips I used to make my program better. You should follow them in your music programs, too:

1) Use loops. One line can be played as many times as you like, but listen to your music — if it sounds too *repetitious*, cut down the loop a bit.
2) Use short lines. If a line is short, it is easier to edit, and easier for others to type without getting lost.
3) Make sure to tie things in. If the last note of a line is D, try to make the next note the program plays either a D, C or E (unless you are branching out in experimental directions).
4) Follow every PLAY statement with a semicolon to make the music sound smoother.
5) Don't clutter the program with unnecessary things, as is true for any program.

Sounds simple, doesn't it? It is. Now apply these tips and write your own music program. See how short and entertaining my second program is? It's a lot better than running up and down the scale as I did with MUS1. Music programs are the easiest kinds of programs to write — there are no real rules. Go ahead and try it.

**Listing 1:** MUS1

```
10 CLS0
20 FORL=1TO1000:NEXTL
30 PLAY"O3;"
40 FORD=1TO2
50 FORC=1TO2
60 IFC=1THENFORA=1TO2
70 PLAY"T5;L4;CCCDDDEEEFFFGGGAAA
BBBAGFEDCDEFGBAAABBCCDCDCDEDED;L
1;ED;"
80 IFC=1THEN NEXTA
90 IFC=2THENFORB=1TO2
100 PLAY"L1;CDEDC;L2;DEDC;L4;DED
CDEDCDEDCDEDCDEDCDDDEEECCC;"
110 IFC=2THEN NEXTB
120 NEXTC
130 PLAY"CDDDDEEEEFFFFGGGGFEDCDE
FGGGFFFGFGFGGGFFGGGGFFGG;"
140 PLAY"O1;"
150 NEXTD
```

**Listing 2:** MUS2

```
10 CLS
20 PRINT@204,"*MUSIC*"
30 PRINT@227,"WRITTEN BY GIP W.
PLASTER"
40 FORL=1TO500:NEXTL
```

```
50 PLAY"O2;T5;L16;DDDDCCCCDDDDEE
EEFFFFGGGGFFFFEEEEDDDDCCCCDDDDEE
EEDDDDEEEEFFFFGGGGFFEEDDCC;"
60 PLAY"L8;DEFGFEDCDEFGFED;L4;CD
EFGFEDC;L2;DEFG;L1;FEDCC;"
70 PLAY"T8;L1;DDEEFFGGFFGGDDEECC
FCDECCGGFDECCCDEFGGFCDECFGGGDECF
G;"
80 FORA=1TO2
90 PLAY"T5;L2;GGDDGGEEFFDDGGCC;L
4;GFEDCDEFGFEDCDFFGGDDCCEEFF;"
100 NEXTA
110 PLAY"L1;EDC;O1;GFEDCBA;"
120 PLAY"L4;CDEFGFEDCDEFGFDECCDE
FGGFDECCDEFFFFDEFGCDEFFGFFCDEEFG
CCDED;"
130 PLAY"L2;DEFGFEDCDDEEFFGGFFFF
EEEEDDDDCCCCDDDDEEEEFFFFGGGGFEDC
CCDEFGFDECFFG;"
140 PLAY"L1;FED;T2;EFGFFF"
```

# Graphics

## Laying It on the Line

16K
ECB

### By Keiran Kenny

*Linedraw* is a short graphics program that lets you draw lines anywhere on the screen, at any angle.

You begin with a flashing cursor in the center of the screen. Press an arrow key (just once) and the cursor will move in the arrow direction. Press another arrow key to change direction, or any other key (except 1 or 2) to stop movement.

Press 1 to set the beginning of a line. Move the cursor to where you want your line to end, and then press 2 to draw it. The flashing cursor will remain at the end of your line, waiting for your next move.

**The listing:** LINEDRAW

```
0 'TENLINER': BY KEIRAN KENNY,
  THE HAGUE, 1987.
10 PMODE4,1:COLOR0,5:PCLS:SCREEN
1,1
20 X=128:Y=96
30 PSET(X,Y,0):FORD=1TO30:NEXT:P
SET(X,Y,5):FORD=1TO30:NEXT
40 IFP=94THENY=Y-1:IFY<0THENY=0
50 IFP=10THENY=Y+1:IFY>191THENY=
191
60 IFP=8THENX=X-1:IFX<0THENX=0
70 IFP=9THENX=X+1:IFX>255THENX=2
55
80 IFP=49THENH=X:V=Y
90 IFP=50THENCOLOR0:LINE(H,V)-(X
,Y),PSET
100 P=PEEK(135):GOTO30
```

## CoCo's Daring Flying Machine

16K
ECB

### By John Musumeci

Learn the secrets of flight and animation with *Airplane*. The program draws an airplane flying through the air with the greatest of ease.

**The listing:** AIRPLANE

```
10 PMODE 3,1
20 SCREEN 1,0
30 PCLS
40 DRAW "BM35,80;E15;R185;G15;L1
85"
50 DRAW "BM40,110;R185;G8;L185;E
8"
60 DRAW "BM48,75;D35"
70 DRAW "BM50,75;D35"
80 DRAW "BM63,70;D40"
90 DRAW "BM65,70;D40"
100 DRAW "BM93,75;D35"
110 DRAW "BM95,75;D35"
120 DRAW "BM108,70;D40"
130 DRAW "BM110,70;D40"
140 DRAW "BM140,75;D35"
150 DRAW "BM142,75;D35"
160 DRAW "BM155,70;D40"
170 DRAW "BM157,70;D40"
180 DRAW "BM185,75;D35"
190 DRAW "BM187,75;D35"
200 DRAW "BM200,70;D40"
210 DRAW "BM202,70;D40"
220 DRAW "BM125,105;M68,108;U23;
F13;BM68,102;M125,85"
230 CIRCLE (125,95),10
240 DRAW "BM117,90;D10;BR15;U10"
250 DRAW "BM100,130;H15"
260 DRAW "BM100,130;E15"
270 DRAW "BM150,130;H15"
280 DRAW "BM150,130;E15"
290 DRAW "BM100,130;R50;D2;L50;U
```

```
2"
300 CIRCLE (100,130),5
310 CIRCLE (150,130),5
320 P$="C3;BM125,95;R2;D2;L2;U2;
BL4;U25;R8;D50;L8;U25"
330 DRAW "A0"+P$
340 GOSUB 420
350 DRAW "A1"+P$
360 GOSUB 420
370 DRAW "A2"+P$
380 GOSUB 420
390 DRAW "A3"+P$
400 GOSUB 420
410 GOTO 320
420 FOR I=0 TO 5
430 NEXT I
440 DRAW "C1;BM125,95;R2;D2;L2;U
2;BL4;U25;R8;D50;L8;U25"
450 RETURN
```

---

## CoCo Cuddler

CoCo 3

### By Bernice Shoobs

The cold is upon us, and winter storms can be fierce. Here is CoCo 3 to the rescue with a winter quilt and a cuddly companion to make your long January nights a little warmer.

**The listing:** PLAID

```
10 REM ***PLAID***
20 REM BY: BERNICE M. SHOOBS
30 REM     CLIFTON, NEW JERSEY
40 'I'VE WOVEN A WARM PLAID BLAN
KET FOR YOU
50 'FOR THESE CHILLY WINTER EVEN
INGS AHEAD
60 'IF YOU DON'T LIKE TO CUDDLE
UP ALONE
70 'I'VE SENT MY VERY BEST FRIEN
D TO KEEP YOU COMPANY.
80 PMODE 3,1
90 PCLS
100 SCREEN 1,1
110 FOR X=0 TO 250 STEP 4
120 FOR Y=0 TO 250 STEP 6
130 LINE (X,Y)-(Y,X),PSET,B
140 NEXT Y,X
150 PALETTE 11,56
160 COLOR 7,6
170 FOR X=64 TO 144 STEP 4
180 FOR Y= 144 TO 64 STEP -6
190 LINE (X,X)-(Y,Y),PSET ,B
200 NEXT Y,X
210 CIRCLE(108,46),3,,.75
220 CIRCLE (106,40),16,,1
230 CIRCLE(102,38),5,,1.5
240 CIRCLE(112,38),5,,1.5
250 CIRCLE(92,28),9,,.75,.30,.95
260 CIRCLE(120,28),9,,.75,.55,.3
0
270 CIRCLE(108,44),8,,1,.12,.40
280 CIRCLE(120,64),14,,1.3,.75,.
06
290 CIRCLE(92,64),14,,1.3,.50,.7
5
300 LINE(118,58)-(122,64),PSET
310 LINE(94,58)-(90,64),PSET
320 GOTO 320
```

# Games

## Back to Square One

16K ECB

### By Louis Martinez

*Puzzle* is like those plastic games you used to dig from the depths of the cereal box — the kind where the letters were scrambled and you had to perform all sorts of maneuvers to get that 'A' up there in Square One and the rest of the letters to fall into place. Usually everything went well until you reached 'P'. Then it seemed nothing would fit; to get 'P' into place, you lost 'O', etc.

Now that you are older and the proud owner of a keener mind and a Color Computer, this mental exercise should present no challenge, right? We'll see. Type in *Puzzle*, use the arrow keys to rearrange the letters, and see if you can get back to Square One.

**The listing:** PUZZLE

```
10 CLS0
20 '***DEFINE LETTER ARRAY***
30 A=65
40 FOR R=1 TO 5
```

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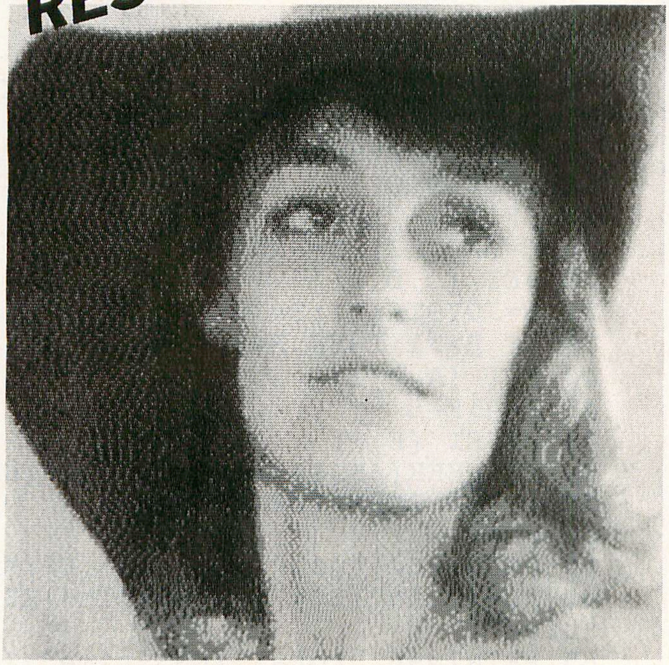

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```
50 FOR C=1 TO 5
60 L$(R,C)=CHR$(A)
70 GOSUB 600
80 A=A+1
90 NEXT C,R
100 R=5:C=5
110 L$(R,C)=" "
120 GOSUB 600
130 F=1
140 FOR N=1 TO 100
150 E=RND(4)
160 ON E GOTO 230,280,390,440
170 NEXT N
180 F=0
190 IF F=1 THEN 170
200 K$=INKEY$:IF K$="" GOTO 200
210 '***MOVE LEFT***
220 IF K$<>CHR$(8) THEN 270
230 IF C>=5 THEN 530
240 T=C+1
250 GOTO 310
260 '***MOVE RIGHT***
270 IF K$<>CHR$(9) THEN 380
280 IF C<=1 THEN 530
290 T=C-1
300 '**MOVE LEFT/RIGHT ROUTINE**
310 L$(R,C)=L$(R,T)
320 GOSUB 600
330 L$(R,T)=" "
340 C=T
350 GOSUB 600
360 GOTO 190
370 '***MOVE DOWN***
380 IF K$<>CHR$(10) THEN 430
390 IF R<=1 THEN 530
400 T=R-1
410 GOTO 470
420 '***MOVE UP***
430 IF K$<>"^" THEN 190
440 IF R>=5 THEN 530
450 T=R+1
460 '***MOVE UP/DOWN ROUTINE***
470 L$(R,C)=L$(T,C)
480 GOSUB 600
490 L$(T,C)=" "
500 R=T
510 GOSUB 600
520 GOTO 190
530 IF F=1 THEN 150
540 PRINT @40,"ILLEGAL MOVE";
550 FOR B=1 TO 250
560 NEXT B
570 PRINT @40,STRING$(12,128);
580 GOTO 190
590 '***DISPLAY MOVE***
600 PRINT @68+R*64+C*3,L$(R,C)+"
 ";
610 SOUND 10*R*C,1
620 RETURN
```

---

16K
ECB

# Hit Me If You Can

## By Chris Gleason

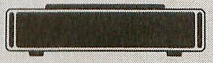
You are a blinking dot, and your job is to move (using the right joystick) directly over a stationary red dot. When you think you have done so, press the firebutton. Don't dally, though; you're working under a time limit. Pretend you are a helicopter pilot who has just a few seconds to hover directly over your target and drop some explosives. If you don't get your job done fast, the forces on the ground will have time to rally and shoot you down. If both dots move and your score increases, you succeed and a new round starts. It's not as easy as it sounds.

**The listing:** HITME

```
5 CLS0
10 E$=CHR$(128):TIMER=0
15 FORI=1TO75:T=INT(TIMER/60):X=
T*100:Q=X/60*10:G=Q/100:G=G*5
20 PRINT@0,"score";V;:PRINT@9,"t
imer";FIX(G);
23 IF I>1 THEN 26
25 C=RND(63):D=RND(31)
26 SET (C,D,2)
30 A=JOYSTK(0):B=JOYSTK(1)
35 IF B>31 THEN B=31
40 SET (A,B,1)
45 E=A:F=B
48 RESET (E,F)
50 IF PEEK(65280)=126 OR PEEK(65
280)=253 THEN 100
55 NEXT I
60 PRINT@64,"you";E$;"did";E$;"n
ot";E$;"hit";E$;"it";E$;"in";E$;
"time";
65 PRINT@96,"total";E$;"time";IN
T(H);:FORK=1TO1000:NEXT:RUN
100 IF C=A AND D=B THEN V=V+1:H=
H+G:GOTO 5
105 GOTO 55
```

## Color Connection

*by BJ Chambless*



This is the most comprehensive modem package for the Color Computer!

**All are Protocols Supported** including CompuServe Protocol B, XMODEM protocol, and XON/XOFF. **Auto dial** feature for both Hayes compatible and some Radio Shack modems. You can use **all baud rates** when using the Radio Shack Deluxe RS232 program pack! Printer baud rates are selectable.

You can **print from the buffer** and files bigger than the buffer can be uploaded and downloaded. **Download direct to disk** with automatic XON/XOFF protocol! **Single key macros** allow easy entry of often-used passwords and ID's.

**Hi-Res screens** with a choice of colors are used. All printable characters available and all control characters are supported.

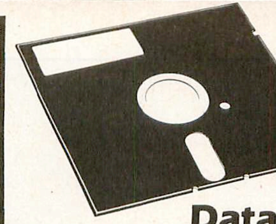
**RSDOS Version** includes two sets, one for CoCo I and CoCo II, the other for CoCo 3.

**OS-9 Connection 3.0:**

The package includes all of the features of the RSDOS version plus runs on OS-9! Versions for both Level I and Level II are included. RS232 pak is required.

| | |
|---|---|
| **RSDOS Disk** | $49.95 |
| **OS-9 Disk** | $49.95 |

*Also available from Radio Shack through Express Order Software*



## Data Master

*by BJ Chambless*

**Simplify with pull-down menus**

All options are available from anywhere in the program. To make it even simpler, each menu option can be invoked by a single character!

**Dialog boxes**

Pop-up windows display current settings and available choices.

**Unique LIST display format**

You view data in easy-to-read rows & columns. From this easy-to-read screen you may edit your data, without having to exit. Mass changes are a snap!

For even more power, use an access key to selectively display a subset of records and can change them right on the screen!

**Compatibility with OS-9 Profile & Data Bank**

You won't lose any of your valuable data!

**Easy Expansion**

with re-definition of records and transfer of files.

**Elements & Records:**

Each record can contain up to 512 characters used within 35 elements. Elements are defined as: alphanumeric (descriptive data), math (real numbers including dollars & cents), date, and derived (formulas calculated from other elements in the same record). You can store any type of data using these field types!

**Display & Entry Screens**

Design up to 9 different screen formats for data display and data entry for each data base. This is helpful for accessing your data for different purposes.

**Sorts & Selections:**

Up to 9 different access keys can be defined. These are used for displaying data on the screen or selecting data for printing. You may use several levels of sorts as well as logical operators to select just the right data. A powerful generic search is also available.

**Reports:**

See your data any way you want by designing your own reports! Data Master offers easy-to-use tools to design professional reports including report headings, titles, column headings, automatic page numbers, column totals, and more. Store up to 9 report formats for each data base.

**File Management**

Built-in file management capabilities allow easy file manipulation for transferring data files, renaming data files, expanding data files, and more.

**Upload/Download**

*Data Master* can read and write standard sequential files which aids in data transfer between DynaCalc and many others.

**Full keyboard ease**

· taking full advantage of the CoCo 3's cursor and function keys.

**OS-9 accessible**

Even while operating within *Data Master*.

| | |
|---|---|
| **Requires OS-9 Level II,**<br>**CoCo 3, 512K** | $64.95 |

## Screen Star

*by Scott Cabit*

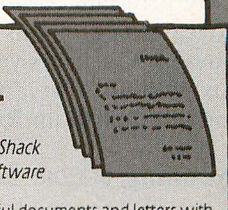
*Also available from Radio Shack through Express Order Software*

**Screen Star** implements the popular **WordStar** editing capabilities. If you know WordStar you already know how to use **Screen Star!**

- **Edit files larger than memory** since Screen Star uses the disk as an extension of memory.
- **Block Commands** – with a keystroke you can mark the start and end of a block, then move, copy, or delete the block.
- **Cursor Movement** is easy with an array of commands to move left or right one character, or one word, or one line; scroll forward or back one line, one screen, one block; jump to the start or end of the line or the screen, block, or file.
- **Find & Find/Replace Commands** make mass changes and searches a snap.
- **Pop-Up Help Menus** are as close as a keystroke.
- **Closing Commands** let you exit the editor with or without save, and can import or export files whenever you need them.
- **Smart Speller** is included.
- **Parameter commands** personalize your environment.
- **Access the OS-9 Shell.**
- **Up to 10 functions keys** can be defined by CoCo 3 users for fast, repetitive functions.
- **Use with the Text Formatter** for a full word processing team. Simply imbed the Text Formatter commands in your Screen Star file and it will be printed in style!
- **Level 1 & Level 2** are supported and both versions are included.

| | |
|---|---|
| **Requires OS-9 Disk** | $49.95 |
| **With Text Formatter** | $74.95 |

## OS-9 Text Formatter



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An easy way to get beautiful documents and letters with OS-9, Text Formatter interfaces with any editor that produces standard ASCII text files.

Features include left and right **justification,** page breaks, special spacing, automatic **pagination,** automatic **page numbering, centering, indenting, tabs,** and sending **escape and control codes** to your printer as well as sophisticated **headers and footers.** Special functions include **macros** for often used sequences, relative arguments, upper and lower case modes, nonprintable remarks, and more!

| | |
|---|---|
| **Requires OS-9** | $34.95 |

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# Utilities

## Color Creator

CoCo 3

### By Adam Breindel

When Tandy released the CoCo 3 with its 64 colors, most everyone celebrated, glad that graphics could be realistic without having to resort to artifacting and other complex graphics tricks.

But some CoCo 3 owners, me included, felt that some colors were missing or insufficiently represented — brown, for instance. Greedily, we wanted yet more colors and shades. I began to wonder just what kinds of video tricks could be accomplished with the CoCo 3's 640-by-192 graphics and an RGB monitor.

Through experimentation I found that colors can literally be blended onscreen, as paint can be blended to produce different colors and shades. This is done very simply by alternating pixels of one color with pixels of another. In high resolution, it is difficult for your eye and brain to separate the alternating pixel patterns, so you begin to see a new color.

My program, *Colormix*, blends colors and illustrates the programming of this process. *Colormix* requests two-digit codes for the colors you want to blend (e.g., enter '8' as "08"). It is helpful to have your color chart handy. This program works best with an RGB monitor.

**The listing:** `COLORMIX`

```
5 'Rainbow Color Mix
6 'BY ADAM BREINDEL
7 'COPYRIGHT (C) 1987
9 ON BRK GOTO 1000
10 HSCREEN 4:PALETTE 0,0:PALETTE
 1,63:HCOLOR 1,0:HCLS
20 HPRINT (10,0),"Rainbow Color
Mix":HPRINT (12,1),"by Adam Brei
ndel":HPRINT (14,2),"Copyright (
C) 1987":HPRINT (2,5),"Backgroun
d color (Mix color #1) ?":R=6
30 FOR Q=1 TO 2
40 Q$=INKEY$:IF Q$="" THEN 40 EL
SE AA$=AA$+Q$:HPRINT (9+Q,R),Q$
50 NEXT Q
60 IF SBR=1 THEN RETURN
70 B=VAL (AA$):AA$=""
80 HPRINT (2,7),"Foreground colo
r (Mix color #2) ?":R=8:SBR=1:GO
SUB 30:F=VAL (AA$)
90 PALETTE 0,B:PALETTE 1,F:HCLS:
HPRINT (31,0),"Rainbow Color Mix
":HPRINT (35,2),STR$(F)+" ON "+S
TR$(B)
95 FOR Y=40 TO 60 STEP 2
100 FOR X=318 TO 330 STEP 2:HSET
 (X,Y,1):HSET (X+1,Y+1,1):NEXT X
,Y
110 HLINE (318,70)-(331,90),PSET
,BF
120 A$=INKEY$:IF A$="" THEN 120
ELSE RUN
1000 HSCREEN 0:SCREEN0:CLS:END
```

## A Smooth Operator

CoCo 3

### By John Blochowiak

*Smoothy* gives your 128K CoCo 3 a screen scrolling capability in the 40-column mode, making scrolled listings easily readable.

Run `SMOOTHY`, load a long BASIC program, and see the results when you list it. You shouldn't have any trouble reading the listing as it scrolls by. `LIST`, `DIR` and `PRINT` are the most useful BASIC commands that are affected by the program. If you want to return to normal operation, just press the reset button.

It is difficult to read ordinary listings because of the way they are scrolled: The screen jumps up the length of one character (eight pixels) when the screen is full. If you were able to move the screen up by more gradual steps (one pixel at a time instead of eight), it would appear to scroll more smoothly and become easier to read. With the help of a few features on the CoCo 3, *Smoothy* does just that.

The secret to this program lies in memory locations 65,436 to 65,438, which directly control the video display generator. Location 65,436 changes the scan-line offset register, while locations 65,437 (MSB) and 65,438 (LSB) change the screen start register. By poking the numbers 0 through 7 at location 65,436, you can offset the character screen from zero to seven scan lines (zero to seven pixels).

**The listing:** `SMOOTHY`

```
1 ' *******************
2 ' *                 *
3 ' *   SMOOTHY/BAS   *
4 ' *       By        *
5 ' * John Blochowiak *
6 ' *                 *
7 ' *******************
8 ' COPYRIGHT (C) 1987
9 '
100 WIDTH 80 : PALETTE 0,0
110 CLS 1 : ATTR 3,0 : WIDTH 40
```

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Designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. Calculates payroll and tax amounts, prints checks and maintains year-to-date totals which can be automatically transferred to the SBA package. Computes each pay period's totals for straight time, overtime and bonus pay and determines taxes to be withheld. Additional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. Suited for use in all states except Oklahoma and Delaware. **$59.95**

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## ACCOUNTS RECEIVABLE

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```
120 FOR A = 449536 TO 449589
130 READ B : LPOKE A,B : NEXT A
140 FOR A = 63572 TO 63600
150 READ B : POKE A,B : NEXT A
160 CLEAR 200,32768 : NEW
170 DATA 204,1,25,183,255,156,14
2,32,0
180 DATA 16,142,40,0,238,129,239
,161
190 DATA 140,39,208,37,247,76,25
3,255
200 DATA 156,129,7,38,232,142,32
,0,238
210 DATA 136,80,239,129,140,39,4
8,37
220 DATA 246,189,248,123,206,0,2
4,255
230 DATA 255,156,53,230
240 DATA 52,102,182,254,4,129,80
,16,38
250 DATA 67,161,142,32,0,236,137
,0,160
260 DATA 237,129,140,46,96,37,24
5,141
270 DATA 12,53,230
```

---

## Adjusting Your Monitor

16K
ECB

### By Ken Ostrer

*Color Tester* lets you know if your color settings are adjusted properly. Colored bars are drawn on the screen and labeled as the color they are supposed to be. It is best to use this program with a color composite monitor or TV; with an RGB monitor, it tries to convince you that gray is red.

**The listing:** COLRTEST

```
10 CLS0:PRINT@8,"color tester";:
E=5:FORW=1TO8:FORX=5TO25:FORY=E
TO E+5:SET(Y,X,W):NEXTY,X:E=E+7:
PRINT@W+7,CHR$(PEEK(W+7+1024)+64
);:NEXTW:PRINT@16,"STER";:FORY=1
TO9:READA$(Y):A$(Y)=A$(Y)+"    "+S
TRING$(3,Y-1+48):NEXTY
20 DATABLACK,GREEN,YELLOW,BLUE,R
ED,BUFF,CYAN,MAGENTA,ORANGE:Y=64
:FORQ=1TO9:Y=Y-1*ABS(Q/2=INT(Q/2
)):FORX=1TO LEN(A$(Q)):PRINT@Y+3
2*X,MID$(A$(Q),X,1);:NEXTX:Y=Y+4
:NEXTQ
30 GOTO30
```

---

## Home Help

## Happy (Un)Birthday to You!

16K
ECB

### By J. T. Smiley

Chances are 364 times out of 365 that this isn't your birthday. But do you know how old you really are? Don't look so smug. *Birthday* tells you how old you are right down to the second. Try not to feel uncomfortable when running this program — 504,576,000 seconds old, for instance, is just a drop in the bucket. According to American average life expectancy, a person of that age would have approximately 1,892,160,000 seconds left to live.

**The listing:** BIRTHDAY

```
10 CLS:PRINT@8,"HAPPY BIRTHDAY'S
"
20 DIM M(12)
30 PRINT:PRINT:PRINT "ENTER TODA
Y'S DATE:"
40 PRINT "(MONTH,DAY,YEAR)"
50 INPUT M,D,Y:GOSUB 180:N=T
60 PRINT:PRINT "AND YOUR BIRTHDA
Y"
70 INPUT M,D,Y:GOSUB 180:B=T
80 K=N-B
90 PRINT:PRINT "YOU ARE ";K/365;
" YEARS OLD"
100 PRINT K" DAYS,"
110 PRINT K*24" HOURS,"
120 PRINT K*24*60" MINUTES AND,"
130 PRINT K*24*60*60" SECONDS OL
D!!!"
140 RESTORE: FOR I=1 TO 12: READ
 D$:NEXT
150 LET X=B-7* (INT(B/7))
160 FOR Z=1 TO X:READ D$: NEXT
170 PRINT "ALSO, ":PRINT "YOU WE
RE BORN ON A ";D$;"DAY!":END
180 RESTORE :T=0
190 X=Y-1901:A=INT(X/4)
200 T=T+A+(365*X)
210 FOR I=0 TO M-1:READ M(I)
220 IF Y/4=INT(Y/4) THEN M(2)=29
230 T=T+M(I): NEXT I
240 T=T+D: RETURN
250 DATA 0,31,28,31,30,31
260 DATA 30,31,31,30,31,30
270 DATA TUES,WEDNES,THURS,FRI,S
ATUR,SUN,MON
```

# <<< GIMMESOFT >>>

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## MULTI-LABEL III

(CoCo III only)

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(See July '87 review) Disk.................................... $16.95

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| | |
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(See June '87 review)

---

## PYRAMIX

(CoCo III only)

This 100% machine language arcade game was written exclusively to take advantage of your CoCo 3. The colors are brilliant, the graphics are sharp, and the action is hot! You'll enjoy hopping Kubix around the pyramid as he changes the colors of the blocks, but you'll have to avoid Kaderf, Smack, Smuck, and the Death Square!

Disk................................ $19.95

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(CoCo I/II/III)

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(See May '87 review) Disk.............................. $19.95

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(CoCo I/II/III)

This is the long-awaited response to the huge demand for a Kung-Fu program for the CoCo. The graphics and sound effects are spectacular! The action and animation will please even the most die-hard arcade enthusiast. Destroy your opponents and evade obstacles as you grow even closer to your ultimate objective!

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(CoCo I/II/III)

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## Improve Your Typing Skills

4K

### By Brent Dingle

*Typer* is a short program designed to improve your keyboarding skills. When you run the program, you are asked for the skill level you want to start with; however, this level goes up or down depending on how well you do.

A model of your keyboard, complete with letters and numbers, appears on your screen. Each letter or number has a black box above it. Watch the screen carefully! If one of the black boxes turns red, you must press the appropriate key, and do it fast. It will stay red only a very short time, and the time gets shorter as the levels get higher. If you press the correct key in time, a beep sounds and 10 points are added to your score. If you miss, five points are subtracted. But don't despair, your score will never drop below zero!

As you press more correct keys, letters will begin disappearing from the screen, but their boxes will remain. If the box above the missing letter turns red, you still must press the letter, or lose five points. The letters will return if you have difficulty.

**The listing:** TYPER

```
5 DIM L$(36),L(36),M$(500),J(36)
:B$=CHR$(128)
10 CLS:INPUT"DIFFICULTY PLEASE.
           (0- EASY, 10- ALMOS
T IMPOSSIBLE)";DF:PRINT:PRINT"PR
ESS ANY KEY TO BEGIN."
15 A$=INKEY$:IFA$=""THEN15
20 FOR T=1 TO 36:READ L$(T),L(T)
:NEXT T
30 CLS3:FORT=1TO36:PRINT@L(T),B$
;:PRINT@L(T)+32,L$(T);:NEXTT
50 PRINT@458,"SCORE : ";SC;:S=RN
D(36):L$=L$(S):L=L(S)
55 IF DF>8 AND S<11 THEN S=S+10:
L$=L$(S):L=L(S)
60 PRINT@L,CHR$(191);
70 FOR K=1 TO 100-DF*5:A$=INKEY$
:IF A$=L$ THEN 90 ELSE IF A$="^"
 THEN 150 ELSE NEXT K
75 SC=SC-5:IFSC<0THEN SC=0
80 PRINT@L,B$;:M=M+1:M$(M)=L$:NM
=NM+1:IF NM>20 THEN DF=DF-1:NM=0
82 J(S)=J(S)-1:IF J(S)<-2 THEN P
RINT@L+32,L$;
85 GOTO 50
90 NM=NM-1:SOUND100,1:SC=SC+10:P
RINT@L,B$;
92 J(S)=J(S)+1:IF J(S)>2 THEN PR
INT@L+32,CHR$(175);:J(S)=0
95 IF NM>-30 THEN 50 ELSE DF=DF+
1:NM=0:GOTO 50
100 DATA 1,33,2,36,3,39,4,42,5,4
5,6,48,7,51,8,54,9,57,0,60
110 DATA Q,129,W,132,E,135,R,138
,T,141,Y,144,U,147,I,150,O,153,P
,156
120 DATA A,226,S,229,D,232,F,235
,G,238,H,241,J,244,K,247,L,250
130 DATA Z,323,X,326,C,329,V,332
,B,335,N,338,M,341
150 CLS:PRINT"YOU MISSED ";M;" T
IMES.":PRINT"YOU SCORED ";SC;" P
OINTS.":FORX=1TO500:NEXTX:PRINT"
HERE ARE THE LETTERS YOU MISSED.
(PRESS <SHIFT> AND <@> KEYS TO
STOP - IF NEEDED)"
160 FOR T=1 TO M:PRINT M$(T);" "
;:NEXTT
170 PRINT:INPUT"PLAY AGAIN";Q$:I
F LEFT$(Q$,1)="Y" THEN RESTORE:R
UN ELSE END
```

## Business/Finance

## I Owe, I Owe

16K
ECB

### By Bill Bernico

This short, efficient program helps you calculate your monthly payments, whether for a new house, a car, a college loan or that 10,000 Mb mainframe you've been dreaming about.

All you have to do is answer the prompts, and the program will display the monthly payment amount. Press ENTER again at that point and the screen displays the payments broken down into three categories: interest amount each month, principal amount and total payment.

**The listing:** PAYMENTS

```
1 'PAYMENTS by Bill Bernico
2 CLS:INPUT"AMOUNT BORROWED";A:I
NPUT"MONTHS TO PAY";B:INPUT"INTE
REST RATE";C:C=C*.01/12:E=(A*C*(
1+C)^B)/((1+C)^B-1):D=0:F=0:G=0:
PRINT"MONTHLY PAYMENT=";:H=INT(E
*100+.5)/100:PRINTH:GOSUB7:CLS:P
RINT" MONTHLY PAYMENT WAS $";H:G
OSUB8:FORJ=1TOB
3 IFJ/11=INT(J/11)THENGOSUB7:CLS
:PRINT" MONTHLY PAYMENT WAS $";H
```

# Telewriter-64™

## the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

### THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

### TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

### 64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

### 64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

### RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

### FEATURES & SPECIFICATIONS:

**Printing and formatting:** Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW
CERTIFICATION
SEAL

**File and I/O Features:** ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

**Editing features:** Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

### PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

Cognitec
704 Nob Street
Del Mar, CA 92014

Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited. (Add $2 for shipping. Californians add 6% state tax.)

**Available at Radio Shack via express order**

**Coming Soon**
**Telewriter-128**
**for the Color Computer 3**

```
:GOSUB8ELSEK=A*C:I=E-K:IFJ=B THE
NI=A:K=E-I
4 PRINTUSING"### ###,###.## ###
#.## ####.##";J;A;K;I;:D=D+K:F=
F+I+K:G=G+I:A=A-I:NEXTJ:PRINT:PR
INT"   (HIT ANY KEY TO CONTINUE)
";:EXEC44539:PRINT:PRINT" total
     total      total"CHR$(128)
"of interest  principal  payme
nts";:PRINTSTRING$(32,45);
5 PRINTUSING"###,###.## ###,###.
## ###,###.##";D;G;F:PRINTSTRING
$(32,"-");:PRINT"RUN THIS PROGRA
M AGAIN (Y/N)?";
6 A$=INKEY$:IFA$="Y"THENRUNELSEI
FA$="N"THENCLS:ENDELSE6
7 PRINT@484,"HIT ANY KEY TO CONT
INUE";:EXEC44539:RETURN
8 PRINT" mo. princpl   interest
 princpl #    owed     payment
 payment";STRING$(32,45);:RETURN
```

---

# Financial Planning for Your Future

16K
ECB

## By Paul Ruby, Jr.

*CoCo Saver* is designed to help you create and analyze a savings plan for your future. Just enter the initial deposit of a savings account you already have or one you are planning to start.

To make a savings plan work, it is necessary to make regular deposits into the account. *CoCo Saver* is able to calculate weekly and monthly deposits. When you are prompted, enter the initial deposit, the amount of the regular deposits, how long you plan to keep your savings account and the current interest rate. The program presumes that the interest is compounded daily, meaning that the bank pays you interest for each day your money is in the bank.

After you have answered all of *CoCo Saver*'s questions, it will display the amount of money you will have saved for each of the years. Experiment with the interest rates and the payment amounts; you may find the results interesting. Remember, the time to save for the future is now.

**The listing:** COCOSAVR

```
10 REM *************************
20 REM **    COCO SAVER        **
30 REM ** PROGRAMMED BY:       **
40 REM ** PAUL RUBY, JR.       **
50 REM **                      **
60 REM ** COPYRIGHT (C) 1987 **
70 REM *************************
80 CLS
90 PRINT@75,"COCO-SAVER";
100 PRINT@129,"PROGRAMMED BY: PA
UL RUBY, JR.";
110 PRINT@199,"COPYRIGHT (C) 198
7"
120 PRINT@490,"PRESS ANY KEY";
130 IFINKEY$=""THEN130
140 CLS:PRINT "INITIAL AMOUNT OF
":INPUT"SAVINGS";ST
150 PRINT
160 PRINT"MAKE <W>EEKLY OR <M>ON
THLY":INPUT"DEPOSITS (W/M)";DP$
170 IF DP$<>"W"ANDDP$<>"M"THEN 1
60
180 IF DP$="W"THENDP=7
190 IF DP$="M"THENDP=30
200 INPUT"AMOUNT OF DEPOSIT";AD
210 INPUT"# OF YEARS TO SAVE";YR
220 INPUT"% EARNINGS (5% IS .05)
";PC
230 AM=ST:CT=1:CLS
240 PRINT@480,"STARTING AT";:PRI
NTUSING"#######.##";ST:PRINT"DEP
OSITS OF";:PRINTUSING"#######.##
";AD:PRINT"A.P.R. OF";PC:PRINT"S
AVE FOR ";STR$(YR);" YEARS"
250 IF DP$="M"THENPRINT"MONTHLY
DEPOSITS"ELSE IF DP$="W"THENPRIN
T"WEEKLY DEPOSITS"
260 FOR A=1 TO YR
270 FOR B=1 TO 365
280 PRINT@480,"YR";A,:PRINTUSING
"#######.##";AM;
290 IF CT=DP THEN AM=AM+AD:CT=1
300 AM=AM+(AM*(PC/365))
310 CT=CT+1
320 NEXT
330 PRINT
340 NEXT
```

**Submissions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.**

**Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.**

# A Glossary of Computer Terms

### By Lee Veal

This glossary is intended as an aid to help bridge the gap between normal English and "computerese." All too often, "computer people" have been perceived as belonging to some kind of priesthood that spouts a litany of "secret words" and incantations to appease some unknown being behind the computer-room door. But we are not a priesthood, we're simply folks. And computers are not gods, but tools. If you learn to speak the lingo, you'll find computers very friendly and helpful.

## A

**ASCII** (ask-ee) an acronym that stands for "**A**merican **S**tandard **C**ode for **I**nformation **I**nterchange." It's a standard eight-bit information code used by most microcomputers and data terminals. Many systems use only seven of the eight bits, providing a total of 128 possible characters, including upper- and lowercase letters, punctuation, numbers, spacing, and machine or control commands.

**Adventure** a game that allows interaction between computer and player, usually a Dungeons & Dragons type of game involving a quest.

**assembly** a low-level programming language. (See **formats, external**)

**auto-answer/auto-dial** modem features that take some of the tedium and bother out of a computer user's daily routine. Modems equipped with "auto-answer" automatically "pick up" the phone when it "hears" the phone ringing. The "auto-dial" feature allows the automatic dialing of phone numbers by the modem. A program can send all the necessary codes and numbers to the modem that will instruct it to dial the number. (See **handshaking routine**)

**auto baud detect** a modem feature that automatically detects the speed at which data is being received from a sending modem. This feature is present only on modems that support more than one speed. (See **Baud** and **BPS**)

## B

**BBS** See **bulletin board system**

**BASIC** (**B**eginner's **A**ll-purpose **S**ymbolic **I**nstruction **C**ode) an easy-to-use language that is likely the world's most popular programming language. Today, we have dialects ("versions") of BASIC for each computer. The CoCo has several versions of BASIC: Color BASIC, Extended Color BASIC, CoCo 3 BASIC or "Super" Extended Color BASIC and BASIC09. BASIC is easy to learn, and many dialects are so flexible that some programmers never find it necessary to learn other programming languages.

**BASIC interpreter** a collection of routines whose job it is to edit, enter and run a BASIC program. (See **formats, internal**)

**Baud** and **BPS** (**B**its **P**er **S**econd) the rate at which bits (**b**inary dig**its**) are sent down a line. The terms "baud" and "bits per second" are nearly synonymous. The most common baud rates for home computers are 300 and 1200. The most common baud rates for commercial use are 2400, 4800, and 9600. At 300 baud a bit is transmitted every 1/300th of a second, which translates to about 25 to 30 bytes per second. At 9600 baud a bit is transmitted every 1/9600th of a second, and that translates to about 800 to 960 bytes per second.

**bit** See **byte**

**bug** any mechanical, electrical or electronic defect that interferes with the operation of the computer. A defect in a program's coding is also referred to as a "bug." There are some who would say that there are no "bugs" in programs, only "undocumented features." Oh, well, a rose by any other name. . .

**bulletin board system** (**BBS**) an online "message board" computer users can "sign onto" using a modem and communications software, which is generally formed by computer clubs and monitored by a SysOp. It is similar to an information network, but works on a smaller scale.

**burn** the process of programming a ROM chip. The process is called "burning the chip" or "blowing the chip." There are two types of programmable ROM chips readily available: PROMs (**P**rogrammable **R**ead-**O**nly **M**emory) and EPROMs (**E**rasable **P**rogrammable **R**ead-**O**nly **M**emory). The reason for burning code into ROM is to prevent users from accidentally or intentionally changing the canned code. Plus, it provides a very convenient and inexpensive way to supply a computer user with a lot of useful software without the need for a disk drive or cassette recorder.

**byte** the basic unit of computer memory. In "computerese," a byte is the smallest addressable piece of information in a computer's memory. A byte is composed of eight **b**inary dig**its** (bits). A value from 0 to 255 can be stored in one byte. These values may be interpreted as letters, or as part of a number; it all depends on how a program defines and uses data. A notation called "hexadecimal" is often used to express the values (alphabetic or numeric) of a byte's contents. And, yes, someone many years ago determined that half of a byte was a "nybble." Even though the term "nybble"

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*Lee Veal lives in Rowlett, Texas, and is employed by Texas Software Support Subdivision of Garland, Texas, where he oversees installation, implementation and maintenance of system software for Garland's NAS/6650.*

appeared in a few computer textbooks, it never really caught on. (No teeth, I guess.)

## C

**C** a programming language. (See **formats, external**)

**CPU** (Central-Processing Unit) extracts and executes machine language instructions that reside in ROM or RAM. The speed at which the CPU does its work is called the processor clock speed, and it is usually measured in megahertz (MHz).

**Centronics** a printing standard quite prevalent in the computer industry. Many computers come standard with Centronics-compatible printer ports. This standard has been adopted almost universally in the computer industry. The Centronics standard entails, among other things, an eight-bit parallel data transfer from the computer to the printer. The cable that links the two devices is a 34-wire cable, so many other signals are being passed between the two devices. However, the main feature of the Centronics standard is the eight-bit parallel data transfer. (See **parallel**)

**COBOL** a high-level programming language. (See **formats, external**)

**CoCo** short for Tandy **Co**lor **Co**mputer.

**commands** instructions to the computer, e.g., `LIST`, `DIR`, `LOAD`, `RUN`, `SKIPF`, `PRINT`, etc.

**compiler** a special program that converts programs written in languages such as COBOL or PASCAL to an executable form. Among other things, a compiler checks your source programs for language syntax errors. Incidentally, correcting all of your program's syntax errors is not a guarantee that your program will work. The logic of your program determines that. (See **formats, internal**)

**Composite video** a signal that includes both the actual video information and the synchronizing pulses. This is the type of signal used to drive most monochrome monitors and many color monitors; it's very similar to a broadcast TV signal, but the CoCo's output does not meet broadcast standards.

**CompuServe** See **information network**.

**cursor** a pointer or marker on a computer's video screen that marks where the next character will be placed when a key is pressed by the user. A cursor can appear in many forms: solid block, underscore, wedge, or just about any other shape. A cursor can blink or it can be a steady display. On some of the new graphics generation programs, the cursor may be replaced by arrows that point to icons. (See **icon**)

## D

**daisy wheel printer** See **printer**

**Delphi** See **information network**

**directory** a "table of contents" of the programs/files on a disk.

**disk** See **diskette**

**disk drive controller** a hardware device that routes and translates commands from a machine language input/output (I/O) routine to an actual disk drive unit.

**disk drive** a specialized device that reads and writes data to a disk and requires a very sophisticated routine to control its operation. Under the direction of a controller, a disk drive arranges disk data into sectors and tracks. The number of tracks per disk, number of sectors per track, and number of bytes per sector and track vary from system to system. (See **SSDD, transfer rate, TPI**)

**diskette** a type of storage medium that consists of a magnetically coated diskette, or disk, housed in an envelope. The coating is similar to the coating used on standard recording tapes, which have been around for years. The disk has several distinguishing characteristics. The actual recording medium (the part inside the envelope) has a hole in the center to accommodate the disk drive hub and at least one small timing hole.

*Editor's Note:* A disk drive spins the diskette at about 300 RPMs. Hard to believe, isn't it? (For more detailed information, see William Barden's "*Delving Into the CoCo Disk*" on Page 180 of this issue.)

**dot-matrix printer** See **printer**

**download** to receive files from another computer via modem or a hard-wired connection.

## E

**EPROM** **E**rasable **P**rogrammable **R**ead-**O**nly **M**emory. (See **burn**)

## F

**file** another word for "program," or part of a program, stored on disk or cassette.

**floppy disk** See **diskette**

**formats, external** the formats in which the program appears to the programmer. If a programmer uses BASIC, the external format looks like BASIC. The same is true for any other programming language. The term "external format" is synonymous with "programming language." Programming languages fall into one of three levels: low, intermediate and high.

*Low-level* languages are very close to the internals of the machine for which it is designed, and are generally referred to as assembly languages. Assembly languages are very detailed languages, and, therefore, much harder to master. Generally speaking, assembly languages do not transport from one system to another very easily since they are so closely linked to the architecture of the host machine. Trying to transfer an assembly language program from one computer to another would be like trying to use gasoline in a diesel engine — it just won't work! Some similarities do exist among the different computers' assembly languages, but transportability is not their strong suit.

*Intermediate-level* languages are often referred to as program generators. At this level, specifications that define the input, processing and output to be done must be provided by you, the user. *dBASE III* is an example of this type of "programming" language. Actually, many database managers probably fall into this category.

*High-level* languages are distinguished by their transportability, standardization and ease of use. These languages are far removed from the internal architecture of the host computer. Some popular high-level programming languages include COBOL (**CO**mmon **B**usiness **O**riented **L**anguage), FORTRAN (**FOR**mula **TRAN**slation), PASCAL and FORTH.

The only language I know of that seems to fall into both the low- and high-level categories is C. C has facilities that allow the programmer to access the machine-related information, if necessary. It can be very far removed from the host machine, too. C's language syntax can be very detailed or very general.

The relative performance (slowest to fastest) of programming languages is hard to gauge because of many variable factors. Generally, the friendlier the language, the slower it is. If a programmer codes only a few lines to produce a long list of formula iterations, chances are the language is relying on canned routines to do a lot of the work. The programming time is reduced, but the run time is probably increased.

**formats, internal** the formats in which the program appears to the computer: tokenized (slowest), intermediate and machine language (fastest).

*Tokenized* is the form in which BASIC programs are held in a computer's RAM (**R**andom **A**ccess **M**emory). In the hierarchy of internal formats, this is the simplest, but also the most removed from the actual machine language and, therefore, the slowest. The process of tokenizing what is "human-readable" is usually performed by routines in ROM (part of the BASIC interpreter). For instance, a `PRINT` command would be reduced to a one-character code followed by a literal (the stuff in quotes) or the variable names whose values are to be printed. While tokenizing may seem to be an unnecessary step, it is done in the interest of speed and memory economy. It would take longer for the BASIC interpreter to decipher the word `PRINT` than it would to decipher a one-character code. Also, it would take more space in your computer's memory to store `PRINT` than it would the corresponding character code.

It is very easy to misunderstand this process because all the programmer ever sees on the screen is nicely formatted BASIC statements, just as they were entered. That is merely an illusion, another function of the text editor. While the text editor tokenizes the BASIC statements you enter, it also detokenizes them back to "human-readable" form, as when you call up a list.

*Intermediate code* is similar in some ways to tokenized code. Intermediate code still requires a run-time interpreter, but interpreting intermediate code is much faster than interpreting straight tokenized code, resulting in faster run times.

A compiler is used to convert your source program to intermediate code. Some software vendors refer to intermediate as i-code or p-code.

*Machine language code*, or *object code* is the fastest and most concise of all internal formats. Like intermediate, its code, too, must be created by a compiler. The source code (usually human-readable languages such as COBOL, PASCAL, BASIC, C, FORTH and Assembler) is input to the compiler and converted to the corresponding machine language code. Some high-level language compilers produce machine language code and others produce intermediate code.

**formatting** preparing a disk to be written to, establishing tracks and sectors.

**FORTH** a high-level programming language. (See **formats, external**)

**FORTRAN** a high-level programming language. (See **formats, external**)

## H

**hand-shaking** a routine used to determine if contact has been established between two communication points, such as computers connected by modems.

**hard disk drive** inflexible and permanently mounted drives within the computer (or its own housing), which have many characteristics in common with disk drives on a mainframe. The capacity for this type of drive is measured in megabytes (a megabyte, or Mb, is one million bytes). Their capacities range from 5Mb to 30Mb in 5Mb increments. These drives transfer data to the CPU much faster than any regular disk drive. The disk platters contained within the unit are coated with essentially the same type of coating used on floppy disks, magnetic tapes and other magnetic storage media.

**hardware** the mechanical part of a computer system: the computer itself and all its peripherals — disk drives, cassette recorder, printer, modem and monitor, etc. — anything that is not software.

**Hertz** one cycle per second. The cycle can be anything ranging from a power plant generation cycle to a radio station broadcast frequency to a CPU processor rate.

Heinrich R. Hertz, a German physicist invented a generator that produced current flow in one direction only. Another type of generator caused electric current to flow alternately in both directions. One is called direct current (DC); the other is called alternating current (AC). Most homes in the U.S. receive electrical power from a power plant that generates alternating current. The rate at which the current changes directions is measured in hertz. The electric current flowing through a standard light bulb in your home changes directions 60 times every second (that's 60 Hz). The appliances in your home, such as microwaves, TVs, washers, dryers, etc., should all have a plate bradded to them that tells you, among other things, that that piece of equipment operates at 60 Hz.

AM radio stations broadcast in the kilohertz (kHz) range (kilo means thousand). FM radio stations broadcast their signals in the megahertz range (mega means million). That's a million cycles per second.

A CPU's speed is measured in MHz. That means that if a CPU's speed is listed as 4.7 MHz, then four million seven hundred-thousand CPU cycles occur in one second.

**hexadecimal** the base 16 numbering system, which is used to express many computer-related values. Our base 10 numbering system ranges from 0 through 9, but Hex ranges from 0 through 15. Since we do not have single-digit numbers to represent the numbers 10 through 15, the letters A through F are used to depict these digits. Hex is a shorthand form of binary; therefore, the use of Hex is preferable to using long strings of zeros and ones as in binary.

## I

**icon** a picture on a menu bar depicting an object or procedure that can be selected with a mouse or joystick.

**information network** a computer network that services many users, nationwide or even worldwide. At the heart of the network there is usually a complex of computers that stores information on a broad spectrum of topics, covering just about everything from human sexuality to movie reviews. Some of them even have a "CB" channel so that users can dial into online CB conversations. They also have Special Interest Groups (SIGs) for just about anything you could imagine. Programs can be uploaded to and downloaded from them. The most well-known information networks are Delphi (see Page 122), CompuServe and The Source. A user needs a modem, a telephone, communications software and a subscription.

**Input/Output** commonly called I/O, a general term for equipment used to communicate with a computer. It can also refer to the act of transferring data to or from a computer. (See **program**)

## J

**joystick** an input device which, when attached to the computer system, can be polled to determine the stick's position. Joysticks have for many years been used with computer games. Recently, however, many "legitimate" applications have been implemented that make use of them for input to business-related programs. (See **mouse**)

## K

**K** a somewhat arcane symbol that simply means 1,000. In "computerese," however, it means 1,024. Therefore, a 64K computer actually has 65,536 bytes of memory, not 64,000.

**kermit** communications protocol for uploading and downloading.

## L

**leased line** telephone lines that are for data communications only.

**laser printer** See **printer**

**letter-quality** printed text that looks as if it were produced on a typewriter. NLQ (Near Letter-Quality) usually refers to output produced by dot matrix printers having very high dot resolution. Daisy wheel printers are usually referred to as being letter-quality. (See **printer**)

## M

**machine language (ML)** See **formats, internal**

**memory** a computer's actual internal storage. All mathematical operations are performed with data that is held in memory. Data stored on disk must be brought into a computer's memory before it can be manipulated in any way. Generally, microcomputer memory is contained in chips called dynamic RAMs. The term "dynamic" means that the memory chips must have a constant source of power. When the micro is turned off, the power to the dynamic RAMs is eliminated, and all data in that memory is lost. Static RAMs are available, but they are more expensive than dynamic RAMs. (See **RAM**)

**modem** a device that converts a computer's digital signals to audio signals. A modem is attached between a computer system and a telephone line. A modem **mod**ulates (converts to audio) and **dem**odulates (converts to digital) signals. If a computer user needs to communicate with another computer system across town or across the nation, a modem is essential.

Here is a simple explanation of what is going on when data is being transmitted down a telephone line: The sending computer sends a "start bit" down the line, which tells the receiving modem that more bits are about to be sent. Then the sender transmits each data bit contained in the byte that needs to be transmitted. The last data bit is followed by a "stop bit." Sometimes the sender transmits two "stop bits" instead of one. A bit called a "parity bit" may also be used. Both the sender and receiver must know what format is being used — otherwise, chaos reigns supreme. The number of bits sent for each byte of data varies from 10 to 12 bits (1 start bit, 7 or 8 data bits, possibly 1 parity bit, and 1 or 2 *stop bits*).

**motherboard** the main printed circuit board in a computer, the board from which all other "life" in the computer springs.

**mouse** a high-precision input device that provides a way to move a pointer (cursor) around on a computer's screen. The device usually consists of a roller ball encased in a housing that contains the necessary circuitry to indicate the ball's position. The mouse may also have one or two push buttons. When pressed ("clicked"), these buttons may indicate to the program in memory that a certain function needs to be performed. If a computer can input data from an analog joystick, then a mouse will probably work, too. The "moving" and "clicking" functions associated with the mouse cannot be done unless the program resident in memory is designed to accept input from a mouse. A mouse is not a magic input device; it must be supported by the computer system as well as the resident program. If your computer and program are not designed to accept input from a mouse, then it will be quite useless.

## O

**online database** See **information network**

**OS-9** a multiuser, multitasking operating system designed to allow greater flexibility for the user. An operating system is a group of programs (software) which allows the user to communicate more easily with the computer and its associated peripherals. OS-9 allows more than one person to use a single computer at the same time. It also allows more than one process (program) to run at the same time. The major difference between OS-9 Level I and OS-9 Level II is in memory support. Level I is designed to operate on 64K systems while Level II, through the use of memory management techniques, can utilize much more memory. An example would be Level II running on a 512K CoCo 3.

## P

**parallel** a method of data transfer. Parallel transfer implies that more than one bit at a time is transferred. The most common width used in parallel transfers on micros is eight bits. That is, a data path eight bits wide is used to transfer data from one device to another. (See **serial, transfer rate**)

**PASCAL** a programming language. (See **formats, external**)

**pixel** a picture element of your screen. A computer's video display is broken down into a specific number of pixels, which are points on a video screen that can be controlled by the computer to be either off or on. The resolution of a computer's video output is expressed in pixels. If a computer is said to have a video resolution of 320 by 200, then it has 320 horizontal pixels and 200 vertical pixels, and the entire screen has 64,000 pixels that can be used to build graphics displays.

**port** circuitry within a device that is designed to handle some type of data or signal transfer.

**printer** a device that turns video output into printed output. There are basically three types of printers: daisy wheel, dot matrix and laser.

A *daisy wheel* printer is characterized by its ability to produce letter-quality output. The name "daisy wheel" comes from the print wheel's resemblance to a daisy. Each of the 100 to 124 "petals" on the daisy has a printable character on the end of it. When the computer sends the printer an 'x', the printer spins the daisy wheel until the 'x' is positioned in front of the print hammer. The hammer then fires, slamming the "petal" against the printer's roller, thereby effecting a transfer of ink from the ribbon to the paper in the form of an 'x'.

The *dot-matrix* printer is characterized by the somewhat "computer-looking" appearance of its text. Printing is accomplished by the controlled firing of a column of tiny wires. As the print head travels across the page, the wires are fired, thereby pressing their tips against the ribbon and paper. Each firing produces only part of a character; rolling the paper up while a line is being printed illustrates this fact. Most dot-matrix printers have a nine-pin configuration although some have only seven or eight, and many newer models have 18 or 24 pins. Using more pins puts the dots closer together and increases resolution.

*Laser printers* are fairly new, but work on a similar principle. Instead of firing pins, however, they create an image by firing a laser beam at a light-sensitive drum or belt; this image is then transferred to paper as it would be in a copier. Laser printer text and graphics, with a typical resolution of 300 dots per inch, approaches the quality of that produced by more expensive typesetting systems; this has given rise to the newest computer trend of desktop publishing.

**program** a computerized set of instructions, or the act of writing one. The act of programming is the process in which a "programmer" writes instructions that will ultimately cause a computer to execute a predetermined cycle that produces a product or performs a particular function. There are two major aspects to a program: its source (input) and object (output).

A *source* program is a programmer's input to a compiler and is written in a language that lends itself to modification. Source programs are written in symbolic form. This symbolic form lends itself well to modifications that must be made to the program. Writing in a symbolic language (such as COBOL, PASCAL, etc.) frees the programmer to think about how to solve a problem rather than how to make the program communicate with the computer.

An *object* program is the output produced by a compiler after a source program has been compiled. The object is considerably more compact and concise than the source program. This form of the program is usually in machine language, and it is this version of the program that actually runs on the computer. All data and instructions have been completely resolved as to their location in memory.

## R

**RAM** (**R**andom **A**ccess **M**emory) a type of computer memory that may contain data, tokenized BASIC code, various types of intermediate code or actual machine language. Programs or data may be loaded from disk, tape or keyboard into RAM. The contents of RAM can be modified, whereas the contents of ROM cannot.

**RGB video** the red, green and blue video signals in an RGB system that are kept separate; the synchronizing pulses are usually separate from the video signals, as well (as in the case in the CoCo 3). RGB video provides much better quality than composite color systems because none of the detail information is lost in transmission.

**ROM** (**R**ead-**O**nly **M**emory) a type of memory that contains canned routines provided by a computer manufacturer, a third-party software vendor, or a user who has "burned" his or her own ROMs. Some examples of the types of routines in ROM are BASIC language interpreters; peripheral device drivers; complex mathematical routines; utility commands, such as directory displays, file copying, deleting, renaming functions, disk initialization and graphics commands (`CIRCLE`, `LINE`, `PAINT`, `DRAW`, etc.); memory; and machine diagnostics. (See **burn**)

**routine** or **subroutine** specialized sequences of instructions within a program that perform a specific function.

People use routines daily and so do computers. Neither can function without them. For instance, "getting ready for work" is a routine, and shaving, showering and dressing are all subroutines within the whole process. It is very similar in a computer program. A program may have a routine to write a payroll check, which is supported by several subroutines that do things like calculate gross pay, Social Security deduction and withholding, and determine if insurance is to be deducted this pay period, etc.

**RS-232** a **R**ecommended **S**tandard for data communications. Basically, it has to do with pin or wire function designations within a 25-pin cable. Manufacturers of equipment that use the RS-232C standard are not compelled to adhere to the standard to the nth degree. It is for this reason that it is wise to purchase data communications equipment from a source that is knowledgeable about your computer and modem.

## S

**SSSD, SSDD, DSDD** the recording tolerances for a specific disk and/or drive. These initials represent several terms: SSSD, Single Sided, Single **D**ensity — used on some early Apple computers; SSDD, Single Sided, **D**ouble **D**ensity — used on the CoCo, Commodore and Atari; DSDD, **D**ouble Sided, **D**ouble **D**ensity — used by IBM PC/XTs, PC/ATs, and clones.

"Sided" indicates the number of sides that a disk manufacturer guarantees to be usable. However, it has been my experience that many brands of SSDD disks work just fine for DSDD operations. I have heard and read several other testimonials bearing witness to the fact that, in most cases, SSDD disks will work in a DSDD drive.

"Density" refers to the distance between the bits of data on the disk. The coating on a DD disk is good enough to tolerate a much closer fit. Depending on their manufacture date, disks marked "SD" may not have a high enough quality coating to tolerate DD recording. (See **TPI**)

**sector** the smallest addressable and transferable unit of data on a disk.

**Serial** a method of data transfer. Serial data transfer implies a sequential data transfer one bit at a time. Modems transfer data serially down a telephone line. Many printers accept data from a computer serially, too. (See **transfer rate**)

**SIG** Special Interest Group (See **information network**)

**software** programs stored on disk, cassette, ROM chips, etc.

**standards** conventions formed by a committee or by a manufacturer who has a clear market edge on a product — everyone else simply must fall in line. Standards are not laws, but most computer manufacturers generally don't muddy the water by crossing up their systems. And if a manufacturer wants to sell to a wide consumer base, it will not usually deviate too far from the standard.

**stepping rate** the time expressed in milliseconds (thousandths of a second) for how long it takes to move a floppy disk drive's access mechanism from one track to an adjacent one. The lower the number, the faster the stepping rate. The most common stepping rates are 6, 12, 20 and 30 ms.

**SysOp** someone who sets up and monitors a BBS.

## T

**TPI** a density designation of Tracks Per Inch. For disk drives it indicates the distance from one track to the next. For disks it indicates the density tolerance. A disk marked as 48 TPI is intended for use on a 40-track drive. A disk marked as 96 TPI is intended for use on an 80-track drive. A 96 TPI disk could be used on a 40-track drive, as long as other drive and sector characteristics were compatible.

**third-party** products purchased from someone other than your computer's manufacturer. If you have an Epson printer attached to your CoCo, then your printer is a third-party piece of hardware. If you run a copy of *Telewriter* on your CoCo, then you are running third-party software.

**tokenized** the process by which high-level languages are made understandable to the computer. (See **formats, internal**)

**track** areas organized to hold data on a disk, arranged in concentric circles.

**transfer rate** the speed at which data is transferred from the CPU to a disk drive or any other peripheral device. Speeds vary depending on many factors, but the primary factor is the simultaneity — that is, how many bits are sent at a time. An eight-lane highway allows more cars to arrive at their destination in an hour than does a one-lane highway.

## U

**upload** to send files to another computer via modem or hard-wired connection.

## V

**voice-grade line** standard telephone lines that may also be used for data communications.

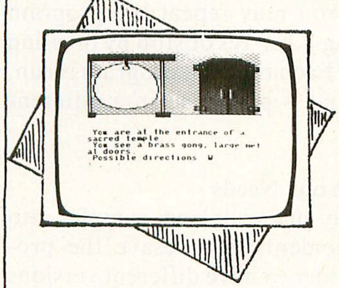
## X

**Xmodem** a communications protocol for uploading and downloading.

## Y

**Ymodem** a communications protocol for uploading and downloading.

Valkyrie



```
You are at the entrance of a
sacred temple
You see a brass gong, large met
al doors.
Possible directions  W
```

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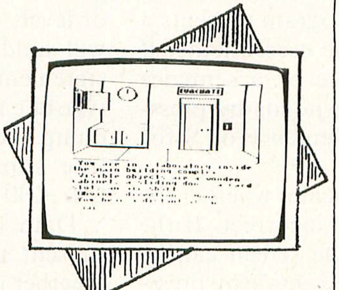
100% ML Graphics Adventure
. . . $19.95



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# Know What I Mean?

## By Fred B. Scerbo
## Rainbow Contributing Editor

*Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget this is BASIC. All programs resulting from your wishes are for your use, but remain the property of the author.*

While I sat there all confused. All by myself. Soon after I knew.

Does anything make sense yet? Of course not. I just started this month's column with three sentence fragments. None of them form a complete thought by themselves, but with a little rewording, all of them could be made to make perfect sense.

You would be amazed at the number of students who have difficulty recognizing sentences and sentence fragments — sometimes even my students have trouble distinguishing them. (I often find compositions full of fragments; however, this usually indicates the students have not proofread their work.)

With the fragment problem in mind, I designed this month's program, *Sentence Fragments*. It is the combination of a number of requests from parents and a few tips from some of my fellow instructors.

---

*Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.*

### Optional Speech

The most frequent request I receive is for programs to work with the Tandy Speech/Sound Pak. A number of CoCo users who own the Pak are quite upset about the lack of serious software for it. Therefore, in the past year I have tried to make as many of my programs as possible able to use the Pak. Besides, it gives you one more opportunity to show your friends what your CoCo is capable of doing. *Sentence Fragments* permits speech, but does not need it to operate. In fact, you may prefer not to have it talk. The voice can get on your nerves after a while. Still, it makes a nice option for younger students just learning to read.

### The Program

Written in Extended Color BASIC, this program should easily fit into a 16K machine. However, if you add your own data, you may need to do a `PCLEAR1` in order to have enough free memory. Right now, with 50 short examples, the program has only a few bytes to spare without the `PCLEAR` command.

In a nutshell, the program presents a statement and asks the user whether it is a complete sentence or a sentence fragment. The user responds by pressing C for Complete Sentence or S for Sentence Fragment.

The screen then indicates whether the response is correct or incorrect. If the response is correct, the screen can be advanced to the next example by pressing ENTER.

If the statement is a complete sentence, then the program will simply show the next statement. However, if the statement is only a sentence fragment, the screen will give an example of how the fragment can be changed into a complete sentence and make a complete thought. This is probably the program's best feature. Students often cannot tell what is missing from a sentence fragment. Therefore, this feature helps to reinforce a better understanding of sentence closure.

### Running the Program

When you run the program, a familiar title screen appears. Press T for Talking or N for No Talking. The rest of the program is self-explanatory. Pressing the @ key shows your score. You may return to where you left off by pressing C for Continue.

After the last problem has been presented and answered, the scorecard appears. You may repeat the program by pressing Y for Yes or stop by pressing N for No. Each time the program is run, the material is presented in a different order.

### Meeting Your Needs

You may put your own samples into `DATA` statements and resave the program in order to have different versions or levels of this material. The program will hold a maximum of 50 problem statements. To add your own data, first type `DEL1000-4999` and press ENTER to dump the present data. The last `DATA` line should always be `5000 DATA END,END,END`.

Data is entered simply. First, you present the statement. Next, indicate whether it is a complete sentence (C) or a sentence fragment (S). The third piece of data in a line is the conclusion to a statement if it is a fragment or an "OK" if the statement is a complete sentence (no ending is needed to make it a complete thought).

The format should look like this:

```
1000 DATA statement,C or
  S,conclusion or OK
```

Here is an example of a complete sentence:

```
1000 DATA I AM VERY HAPPY,C,OK
```

Data entry for a fragment would look like this:

```
1000 DATA SINCE IT STARTED
  RAINING,S,I HAVE BEEN SAD
```

Notice that you do not use periods at the end of the first statement. This is done to prevent giving away any clues or making it too difficult to tack something onto the end of a fragment. Question marks may be used, however.

Be sure to use quotes to surround any data that may have commas in it. Check Line 1300 for an example. Save your own data with different filenames. In time, you may have a very large library of custom software.

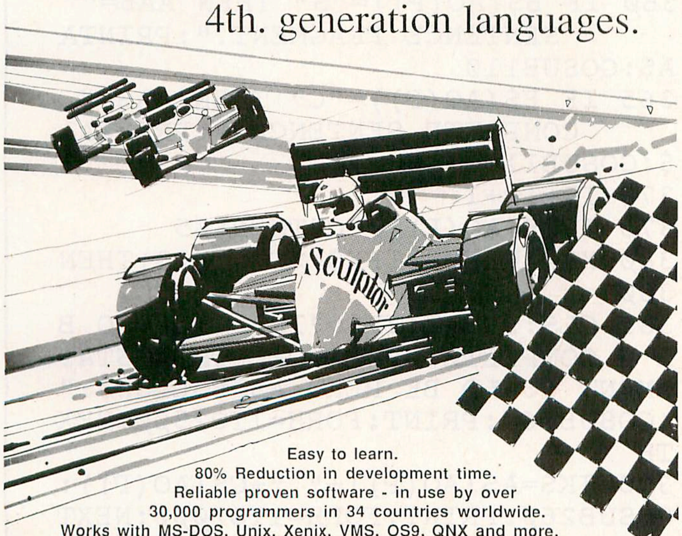
**Conclusion**

I would like to give a special thanks to fellow teacher Nancy Horsefall for coming up with the sample data for this program. Nancy is using this program with her own students now. In fact, it was partly her idea to use some of the lyrics and song titles you see in the data. That's part of what makes the program so much fun. Thanks, too, to all of you who keep sending your ideas. That's what makes this column possible. ☐

| | | | |
|---|---|---|---|
| 45 | 30 | 1070 | 216 |
| 150 | 78 | 1210 | 84 |
| 270 | 197 | 1330 | 172 |
| 360 | 133 | END | 101 |
| 440 | 139 | | |

**The listing:** SENTENCE

```
1 REM *************************
2 REM * RECOGNIZING COMPLETE *
3 REM * SENTENCES & FRAGMENTS*
4 REM *    BY FRED B.SCERBO   *
5 REM *    60 HARDING AVE.    *
6 REM * NORTH ADAMS,MA 01247 *
7 REM *  COPYRIGHT (C) 1987   *
8 REM *************************
9 CLEAR2000
10 CLS0:FORI=1TO64:PRINTCHR$(172
);:NEXT
15 FORI=1TO192:READA:PRINTCHR$(A
+128);:NEXT
20 DATA94,92,92,88,53,60,60,53,6
0,56,59,48,58,60,61,60,56,62,60,
53,50,53,53,60,60,53,60,56,,94,9
2,92
25 DATA90,,,,52,60,61,53,56,,58,
57,58,,53,,48,62,48,53,52,55,53,
,,53,56,,,90,,
30 DATA94,92,92,,52,60,60,52,60,
56,56,,56,,52,,48,60,60,52,48,52
,52,60,60,52,60,56,,92,92,93
35 DATA90,,94,92,93,85,92,92,93,
```



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```
85,92,92,93,85,92,94,93,85,92,92
,85,82,,90,92,92,94,92,88,,,85
40 DATA90,80,91,83,87,85,83,83,8
7,85,,81,83,85,,90,85,85,92,92,8
5,84,82,90,,,90,,,,,85
45 DATA90,,90,84,83,85,,,85,85,8
3,83,87,85,80,80,85,85,83,83,85,
,84,90,,,90,,83,83,83,87
50 FORI=1TO64:PRINTCHR$(163);:NE
XT
55 PRINT@357," RECOGNIZING COMPL
ETE  ";:PRINT@389," SENTENCES &
FRAGMENTS ";:PRINT@421," (T)ALKI
NG OR (N)OT ?  ";
60 PRINT@453,"    BY FRED B.SCERB
O    ";
65 PRINT@485,"  COPYRIGHT (C) 19
87   ";
70 X$=INKEY$:IFX$="T"THEN90
75 IFX$="N"THEN85
80 GOTO70
85 NT=1:GOTO150
90 CLS0
95 XX=&HFF00:YY=&HFF7E
100 POKEXX+1,52:POKEXX+3,63
105 POKEXX+35,60:GOTO150
110 IFNT=1THENRETURN
115 FORII=1TOLEN(AA$)
120 IF PEEK(YY)AND 128=0 THEN120
125 POKEYY,ASC(MID$(AA$,II,1))
130 NEXTII
135 IFPEEK(YY)AND128=0THEN135
140 POKEYY,13
145 RETURN
150 DIM AO(51),A$(51),B$(51),C$(
51),N(51)
155 CLS0:PRINT@264," PLEASE STAN
D BY ";
160 SW=28:KZ=RND(-TIMER)
165 FORJ=1TO51
170 READ A$(J),B$(J),C$(J):IF A$
(J)="END" THEN180
175 NEXTJ
180 J=J-1
185 FORI=1 TO J
190 AO(I)=RND(J)
195 IFN(AO(I))=1THEN190
200 N(AO(I))=1:NEXTI
205 FOR Y=1TO1000:NEXTY
210 CLS
215 FOR P=1TOJ
220 IF P>J THEN RUN
225 CLS:PRINT"    EXAMPLE NUMBER"
;P"."
230 PRINT
235 AA$="     IS THE FOLLOWING A C
OMPLETE         SENTENCE OR A SENTEN
CE              FRAGMENT ?":PRINTAA$
:GOSUB110:PRINT
240 FORHH=1TO2000:NEXT
245 JK$=A$(AO(P)):IF RIGHT$(JK$,
1)="?"THEN255
250 JK$=JK$+"."
255 GOSUB260:GOTO285
260 IF LEN(JK$)<=SW THEN 280
265 FOR T= SW TO 0STEP-1:IF MID$
(JK$,T,1)=" "THEN275
270 NEXT T:GOTO280
275 L$=LEFT$(JK$,T):PRINT"      ";L
$:AA$=L$:GOSUB110:JK$=RIGHT$(JK$
,(LEN(JK$))-T):GOTO260
280 PRINT"      ";JK$:AA$=JK$:GOSUB
110:RETURN
285 PRINT
290 PRINT"          C)OMPLETE SENTEN
CE":PRINT"                    OR"
295 PRINT"          S)ENTENCE FRAGME
NT"
300 AA$="PRESS C FOR COMPLETE SE
NTENCE OR S FOR SENTENCE FRAGMEN
T":GOSUB110
305 G$=INKEY$:IF G$=""THEN305
310 IF G$="C"THEN330
315 IF G$="S"THEN330
320 IF G$="@"THEN425
325 GOTO305
330 IF G$=B$(AO(P))THEN 345
335 GOTO355
340 IF C(F(G))<>AO(P) THEN355
345 PRINT:AA$="   YOU ARE CORREC
T!":PRINTAA$:GOSUB110
350 CR=CR+1:GOTO375
355 PRINT:AA$="   WRONG! THIS ST
ATEMENT IS A":PRINTAA$:GOSUB110
360 IF B$(AO(P))="S" THEN AA$="
     SENTENCE FRAGMENT.":PRINTA
A$:GOSUB110
365 IF B$(AO(P))="C" THEN AA$="
      COMPLETE SENTENCE.":PRINTAA
$:GOSUB110
370 IR=IR+1
375 IFB$(AO(P))="C"THEN405
380 X$=INKEY$:IFX$<>CHR$(13)THEN
380
385 CLS:PRINT:JK$="IN ORDER TO B
E A COMPLETE SENTENCE, THIS STAT
EMENT COULD BE READ AS FOLLOWS:"
:GOSUB260:PRINT:FORH=1TO2500:NEX
TH
390 JK$=A$(AO(P))+" "+C$(AO(P)):
GOSUB260:PRINT:FORH=1TO2000:NEXT
H
395 JK$="THIS EXPRESSES A COMPLE
TE THOUGHT.":GOSUB260:FORH=1TO20
00:NEXTH
400 PRINT:AA$="  <<PRESS ENTER T
```

```
O CONTINUE.>>":PRINTAA$:GOSUB110
405 X$=INKEY$:IFX$=CHR$(13)THEN4
20
410 IFX$="@"THEN P=P+1:GOTO425
415 GOTO405
420 NEXTP
425 CLS:PRINT:PRINT:PRINT
430 PQ=CR+IR:IF PQ=0THEN PQ=1
435 PRINT"     NUMBER CORRECT = "
CR
440 PRINT
445 PRINT"     NUMBER WRONG   = "
IR
450 PRINT:PRINT"     STUDENT SCOR
E  = ";INT(CR*100/PQ);"%"
455 PRINT:PRINT"     ANOTHER TRY
(Y/N/C)";
460 W$=INKEY$:IF W$=""THEN460
465 IF W$="C" THEN 220
470 IF W$="Y" THEN RUN
475 IF W$="N" THEN CLS:END
480 GOTO460
990 REM ENTER DATA AT LINE 1000
1000 DATA THEY THREW A PARTY ON
SUNDAY,C,OK
1010 DATA AS THEY WERE LEAVING T
HE PARTY,S,", IT STARTED TO RAIN
."
1020 DATA THE CHILDREN RACED TO
THE CAR,C,OK
1030 DATA SITTING ON A PILLOW,S,
WAS A BIG BLACK SLEEPING CAT.
1040 DATA THE ROCKET SHOT ACROSS
 THE SKY,C,OK
1050 DATA HER BROTHER WHO LIVED
IN KANSAS,S,WAS PLANNING TO VISI
T HER IN THE SPRING.
1060 DATA HARVEY CRIED,C,OK
1070 DATA THE SUN ALMOST HIDDEN
BY THE CLOUDS,S,TRIED TO SHOW IT
S FACE ALL DAY LONG.
1080 DATA "AS THEY LEFT, SHE SLI
PPED ON THE ICE",C,OK
1090 DATA THE FIRE ENGINE SCREAM
ING DOWN THE STREET,S,WOKE UP TH
E SLEEPING BABY.
1100 DATA THE OLD CAR SPUTTERED
TO A HALT,C,OK
1110 DATA AFTER THE LONG PARTY,S
,WE ALL DECIDED TO GO HOME
1120 DATA "AFTER THE FOOTBALL GA
ME, THEY WENT OUT TO DINNER",C,O
K
1130 DATA WITH ALL HIS SUITCASES
 PACKED,S,", HE LEFT TOWN IN A H
URRY."
1140 DATA HE WANTED TO JOIN OUR
CAMERA CLUB,C,OK
1150 DATA WHERE WERE YOU STANDIN
G?,C,OK
1160 DATA PLEASE CARRY THIS UMBR
ELLA FOR ME,C,OK
1170 DATA THE GIRLS WERE WEARING
 BLUE JEANS,C,OK
1180 DATA "WITHOUT LOOKING, JIMM
Y STARTED FORWARD",C,OK
1190 DATA THE UNHAPPY OLD MAN SA
T ALONE UNTIL DARK,C,OK
1200 DATA I SHALL STAY HERE?,C,O
K
1210 DATA WHAT IS THE DIFFERENCE
 BETWEEN PAINT AND SHELLAC?,C,OK
1220 DATA THREE BOYS STUCK THEIR
 HEADS OUT OF THE WATER,C,OK
1230 DATA THE LITTLE DOG STOOD O
BEDIENTLY BY HIS MASTER,C,OK
1240 DATA MAY I DRIVE THE CAR?,C
,OK
1250 DATA THE MEETING WAS HELD I
N LOS ANGELES,C,OK
1260 DATA THE BRIGHT SUNLIGHT SH
INING THROUGH THE WINDOW,S,BLIND
ED ME AS I GOT UP FROM BED.
1270 DATA THE WAY THE GIANT LIFT
ED THE WHOLE TREE,S,AMAZED THE L
```

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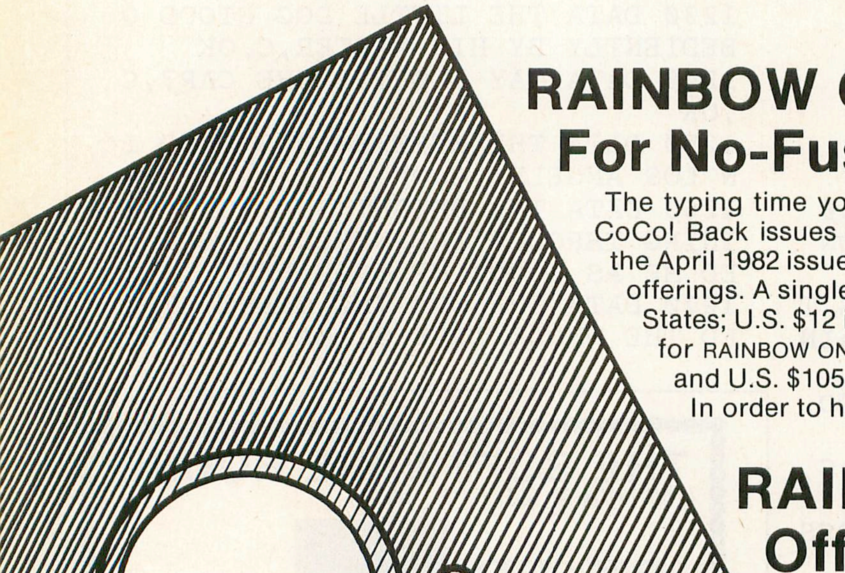

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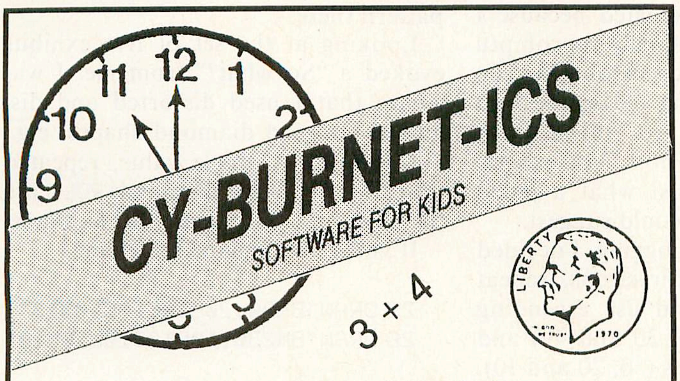
```
ITTLE CHILDREN.
1280 DATA TO PUT OUT THE FIRE,S,
YOU SHOULD SMOTHER IT.
1290 DATA AS THE PRESIDENT BOARD
ED THE PLANE,S,THE CAMERA FOLLOW
ED HIS EVERY MOVE.
1300 DATA JUST IN CASE YOU DIDN'
T KNOW,S,", TODAY IS MY BIRTHDAY
."
1310 DATA COMING THROUGH THE TUN
NEL AT 80 MPH,S,WAS THE BRIGHT N
EW TRAIN
1320 DATA ALL THE IMPORTANT PEOP
LE COMING TO DINNER,S,WILL EXPEC
T TO BE TREATED PROPERLY.
1330 DATA HAVING TOO MUCH MONEY,
S,IS THE LEAST OF MY PROBLEMS!
1340 DATA THE ROOM ALMOST FILLED
 WITH SMOKE,C,OK
1350 DATA WHEN THE OLD MAN DIED,
S,HE WAS ALL ALONE.
1360 DATA AS I WAS ON MY WAY TO
THE STATE CAPITOL,S,I HEARD THE
NEWS.
1370 DATA SOMETHING IN THE WAY S
HE MOVES,S,ATTRACTS ME LIKE NO O
THER LOVER
1380 DATA YOU GIVE LOVE A BAD NA
ME,C,OK
1390 DATA EVERYTIME YOU GO AWAY,
S,", YOU TAKE AWAY A PART OF ME.
"
1400 DATA 'WANTED DEAD OR ALIVE'
,S,IS THE BEST SONG I KNOW!
1410 DATA EVERBODY HAVE FUN TONI
GHT,C,OK
1420 DATA I WISH THEY ALL COULD
BE CALIFORNIA GIRLS,C,OK
1430 DATA 'LIVING ON A PRAYER',S
,IS ANOTHER SONG BY BON JOVI!
1440 DATA LET ME BE THE ONE,C,OK
1450 DATA SINCE YOU'VE BEEN GONE
,S,", THERE'S SOMETHING I WANT T
O SAY."
1460 DATA DON'T DREAM IT'S OVER,
C,OK
1470 DATA HERE I GO AGAIN,C,OK
1480 DATA I SHOULD HAVE KNOWN BE
TTER,C,OK
1490 DATA HAVE IT YOUR WAY,C,OK
5000 DATA END,END,END
```



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# The Kolar Progression

## By Joseph Kolar
## Rainbow Contributing Editor

What good are copious dollops of programming expertise if the spark of creativity is missing? To me, it is better to be a beginner with a creative and open mind than an expert programmer locked into a box of mediocrity.

This tutorial is addressed to the beginner who brings to CoColand an unstructured personal perspective that has room for inspiration. The goal should always be to create something new. This open-ended, inquiring perspective means all the difference in the world to the newcomer. In fact, it makes the difference between feverish, late-night sessions at the keyboard to create a special vision or a dusty tombstone of a CoCo relegated to an obscure corner of a musty closet cemetery.

The beginner is still king. Unlike the tired experts (myself included) who ultimately wind up with repetitious mediocrities, the novice possesses a fresh outlook and is willing and eager to wander down untrodden pathways.

The beginner's unvoiced creed is, "All avenues are worth investigating. All lanes and byways are attractive prospects. No alley is presumed to be dead-ended."

All beginners are urged to experiment on their own. They need not master all programming techniques, and can always refer to manuals and old issues of THE RAINBOW. There is no rule engraved in concrete that stipulates they must memorize everything.

---

*Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.*

You never know where you will end up when you pursue a hot idea. Today we continue on a variation of a theme —developing an idea.

Fire up your CoCo. Key in Listing 1 and run. The five exhibits are odd, but that is the whole idea — to be unique. This display contains our raw material. From this mess we must create something original.

This tutorial was created because I wanted to prepare a small, impromptu graphics program to check out a screen dump program. Using `DRAW`, the first thing that came to mind was `U10R10D10L10` — a box. Not exactly awe-inspiring, but just what a jaded programmer's mind would suggest.

After some mental jogging, I decided to use `URDL`, `DRAW` directions, repeat them a few times and use ascending length values (10, 20, 30 and 40) and then descending values (30, 20 and 10). The plan was to use undulating values and see what happened.

Look at Line 20. It wasn't planned, but it happened. It is the oblong shape, top-center of the display. Continuing the same sequence gets us nowhere because the pattern repeats. Check it out for yourself.

Line 10 sets up the blackboard area. What kind of shape would appear if I used the `EFGH` directions, repeated twice, with ascending lengths 10, 20, 30 and 40 repeated? The boring, rambling design in the upper-left corner was determined by Line 21.

Back to the drawing board! I tried `FGHEDLUR` directions, repeated twice with the familiar undulating values, and produced the exhibit in the lower-right corner of the blackboard. It is formulated in Line 22 — interesting, but suggesting nothing!

Line 23 creates the curious effect in the upper-right region of the display. Study Line 23 and you will note that `DRULEFGH`, repeated twice, was used with our undulating value scheme. This exhibit seems more intriguing. There is space in the lower-left area of the blackboard; Line 24 displayed the pattern there.

Looking at the set of five exhibits evoked a "So what?" from me. I was aware that I used distorted and disguised box and diamond shapes; e.g., `EFGH` with any single value, repeated four times makes a diamond. `RDLU` are the hallmarks of a square or box shape.

If you can't imagine it, key in:

```
25 DRAW"BM20,20E10F10G10H10"
26 DRAW"BM230,10R10D10L10U10"
```

and run. Truly, we are laboring on a variation of a theme. Type `DEL25-26` and press ENTER.

Careful study of the two bottom exhibits carefully gave me a sense of *deja vu*. Inadvertently, both figures are identical except for a 90-degree rotation. Clang, clang, clang went the CoCo alarm in my head. 90-degree rotation? Shades of the `DRAW`, `A` option. Recall that it allows rotation around a point. The urge to experiment is too overpowering to resist.

Type `LIST` and press ENTER. We shall use Line 22. In order to make a loop around Line 22, we have to make room by renumbering the listing.

Key in `RENUM 10,5,10` and then call up the listing. Line 22 is redesignated as Line 40. Mask lines 20, 30, 50 and 60 with `REM` statments. Run. Move the design to center stage by changing the locating values; type `128,96` and press ENTER, then run.

Edit Line 40 to insert `A=X;` after the first quote mark, and add these lines:

```
39 FOR X = 0 TO 3
41 NEXT X
```

and run. No matter how mundane a design may be, if it is attractively centered, it emits a special aura.

The design looks a little congested. No `S` size value was used, and CoCo reverted to the default size, `S4`. Edit Line 40 again, and after the first quote, insert either `S6` or `S7`. Run. Caution: Values of numbers that are not multiples of 4 are seldom used in graphics displays, as they are likely to distort a carefully worked-out design.

Save our work as `"ODDSENDS"`. Type `NEW` and press ENTER to clear CoCo's memory.

Key in this mini-program:

```
10 PMODE4,1:PCLS:SCREEN1,0
20 DRAW"S16BM90,100 BDNR19BU
   U5ER2FD3NCLD2 BR4U6R3FD2GLN
   L2F2 BR5U6HL2R2
30 GOTO 30
```

Run, and notice the height of the space between the bottom of the characters and the underline.

In Line 20, change `16` to `14` and run.

Size `S15` makes the distortion even more pronounced. In a long word, these distortions are carried from letter to letter so that the word looks like a drunken sailor, wobbling upward or downward.

If I am not mistaken, `S16` makes a fine enlargement of `S8`. Again, multiples of 4, like `S4`, `S8`, `S12`, etc., are OK. Use other sizes warily! Type in `NEW` and press ENTER to clear memory.

Key in Listing 2 from Line 0 to Line 60, and also Line 500.

We are going to make four exhibits in our pseudo-art color show. To activate each exhibit press keys 1 through 4. If you press any other key, except SHIFT or BREAK, you will return to Exhibit 1.

Now, Line 30 only calls Exhibit 1. Using a basic octagon shape (`ERFDGLHU` repeated three times) and lines 10 through 40, undulating, make a nice symmetrical design. Wouldn't you guesstimate that you would need four repeats to create the four-leaved goody? Do you see why you need only three repeats?

Key in lines 70 through 110. This one is a mixed bag of directions. `EHFGRDLU`, repeated seven times in our undulating 10 to 40 to 10 value progression is Exhibit 2. Run and press 2. This dud suggests nothing!

Key in lines 120 through 160. Into string `B$` we pack `HGFERDLU`, repeated three times, in our by now familiar value progression. Line 130 gives us a double dose on the screen when we run and press 3.

To demonstrate that this is an exact, replicating design, we unmask Line 140 and key in `C2`, yellow, and obliterate our hard work. Easy come, easy go!

Key in the rest of the program. Line 170 packs into `B$` the same scoop as in Exhibit 1, (lines 40 and 50). After keying in lines 170 and 180, run the program. Key in Line 190 and run again.

Note that Line 190 is in size `S6`. It has to be recentered, but this is not perfect, as you will spot upon careful inspection. Look at the vertical pairs of lines. Horizontal `53` makes the left pair wider than the right pair. Horizontal `54` makes the right pair wider than the left pair. This is the distortion factor we have to learn to live with.

As an aside, try masking Line 180 and enter `60 GOTO 160`. Run and press 1. If you want to restore Exhibit 4, unmask Line 180 and type `60 GOTO 60`.

We *might* as well color some of the inner blades green.

Key in lines 200 and 210. A dot of color is located within the borders of the area we propose to color. Run. Key in Line 220; we paint the located area green. Run.

Key in lines 230 and 240 and run. Ditto for lines 250 and 260, and then for Line 270. Key in Line 280 and run — the central box is colored. To accent the blades, key in lines 290 and 300 and run.

In order, key in and run lines 310, 320 and 330. To outline our work of art in green, key in Line 340 and run.

Key in lines 341, 342 and 350 and follow instructions. Note: If you didn't mask Line 180, but used `60 GOTO 170`, Line 30 will call this last exhibit with either `1` or `4`.

If you want to save this tutorial, mask Line 140 and save it as `"ZIGZAG"`.

The best part about creating these and similar designs is that, in all eternity, you may be the very first pioneer to create such a unique design.

We haven't explored any of the innumerable possibilities of using this simple, undulating progression of square and diamond themes. You can use the techniques demonstrated in this tutorial to create I don't know what.

Since I dreamed up this system, I think I'll call it the "Kolar Progression." If I know me, I will worry this topic to death in a following tutorial.

You can have a lot of fun making up viable designs with `DRAW`, `PSET` and `PAINT` commands. You can while away

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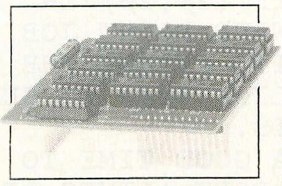

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the hours of your CoCo apprenticeship and become versed in creating interesting, if not spectacular, designs and shapes. You are encouraged to take the Kolar Progression to its very limits and bend it to your will.

The beginner need not have logged in a zillion hours at the keyboard to understand how to make unique and satisfying graphics. You should aim to play with CoCo and drive it nuts in an effort to make that "something special" that reflects your personality.

After all, you can be a hack, copying listings the rest of your computer life, or you can be an enterprising computer Picasso, creating original artwork.

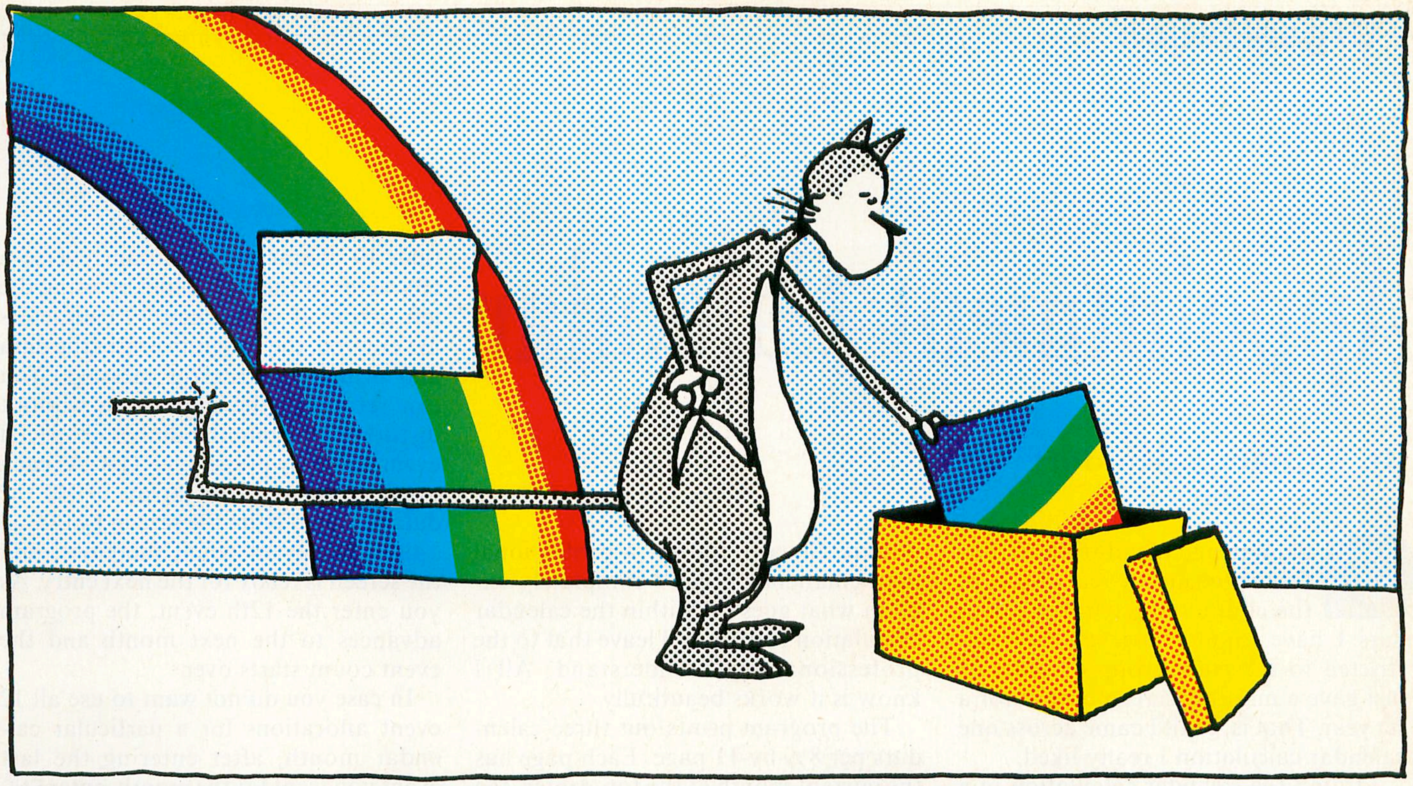
I think I know what your reply must be. Remember that every graphic you create, no matter how simple or complex, is honest-to-goodness art. Why not work up something neat to make Picasso turn over in his grave with envy? ☐

**Listing 1:** ODDSENDS

```
0 '<ODDSENDS>
1 CLEAR 500
10 PMODE4,1:SCREEN1,0:PCLS
20 DRAW"BM130,35U10R20D30L40U30R
20D10L20U30R40D30L20"
21 DRAW"BM122,75 E10F20G30H40R10
D20L30U40E10F20G30H40R10D20L30U4
0"
22 DRAW"BM190,135F10G20H30E40D30
L20U10R20F30G40H30E20D10L20U30R4
0"
23 DRAW"BM200,90D10R20U30L40E30F
20G10H20D30R40U30L20E10F20G30H40
"
24 DRAW"BM50,140 E10F20G30H40R30
D20L10U20E30F40G30H20R10D20L30U4
0"
30 GOTO30
```

**Listing 2:** ZIGZAG

```
0 '<ZIGZAG>
10 CLEAR500
20 PMODE3,1:PCLS2:SCREEN1,0
30 A$=INKEY$:IF A$="" GOTO 30 EL
SEON VAL(A$) GOTO 40, 70, 120, 1
70
40 DRAW"BM78,56 E10R20F30D40G30L
20H10U20E30R40F30D20G10L20H30U40
"
50 DRAW"E30R20F10D20G30L40H30U20
"
60 GOTO60
70 DRAW"BM148,86 E10H20F30G40R30
D20L10U20E30H40F30G20R10D20L30U4
0"
80 DRAW"E30H20F10G20R30D40L30U20
E10H20F30G40R30D20L10U20"
90 DRAW"E30H40F30G20R10D20L30U40
"
100 DRAW"E30H20F10G20R30D40L30U2
0E10H20F30G40R30D20L10U20"
110 GOTO110
120 B$="H10G20F30E40R30D20L10U20
H30G40F30E20R10D20L30U40H30G20F1
0E20R30D40L30U20"
130 DRAW"BM88,96"+B$+B$
140 'DRAW"C2"+B$+B$'DRAWS OVER D
ISPLAY 3
150 '***ADD ONE DIRECTION AT A
TIME TO B$ AND <RUN> TO SEE THE
DESIGN EXPAND AND ROTATE.  IT
MAY BE NECESSARY TO ADJUST <BM>
160 GOTO160
170 B$="E10R20F30D40G30L20H10U20
E30R40F30D20G10L20H30U40E30R20F1
0D20G30L40H30U20"
180 DRAW"BM78,56"+B$
190 DRAW"BM54,36S6"+B$
200 '**** USE <PSET(X,Y,C)> TO
LOCATE  AREAS TO PAINT.
210 PSET(100,50,1)
220 PAINT(100,50),1,4
230 PSET (100,140,1)
240 PAINT(100,140),1,4
250 PSET(150,50,1)
260 PAINT(150,50),1,4
270 PAINT(150,140),1,4'LOCATION
DEDUCED FROM OTHER THREE AREAS
280 PAINT(128,96),1,4'MIGHT AS
WELL GET THE CENTER AREA
290 PSET(128,75,1)
300 PAINT(128,75),1,4
310 PAINT(128,117),1,4'DEDUCED
BY SUBTRACTING 96-75 AND ADDING
THE RESULT TO 96 TO GET VERTICAL
VALUE.
320 PAINT(107,96),1,4' DEDUCTED
21 FROM 128 TO GET HORIZ. VALUE
AND VERT. VALUE FIGURES TO BE IN
 MIDDLE.
330 PAINT(149,96),1,4'THESE
VALUES FOLLOW FROM REASONING.
340 PAINT(0,0),1,4'BLOCK OUT
BORDER SMOOTHLY IN ONE DIRECTION
(DOWN) AS APPOSED TO (20,20)
WHICH GIVES A SPLIT UP; THEN
DOWN PAINT JOB.
341 '***SUBSTITUTE (20,20) IN
<340> TO SEE AWKWARD PAINT JOB.
342 '***TEMPORARILY CHANGE THE
PMODE TO <4> IN LINE <20> TO SEE
FOUR <PSET> POINTS.
350 '****NOW IS A GOOD TIME TO
DELETE THE FOUR <PSET> LINES AT
<210>, <230>, <250>, <290>
500 GOTO500
```



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# Appointment Calendar

### By William J. Holdorf

Calculating calendar dates has fascinated me for years. Most of the computer-generated calendars I have found, however, were restricted to a certain group of years or just gave a monthly screen output for a set year. That is, until I came across one calendar calculation I really liked.

I found the calendar calculation in a program in *Sky and Telescope*, July 1985. According to its author, Robert S. Harrington, U.S. Naval Observatory, Washington, D.C., the calendar calculation was derived from a FORTRAN routine that does the same thing on an IBM 4341. From all appearances, it truly represents a perpetual calendar.

Since I am what you might call an amateur, my knowledge is limited concerning the computer and all its capabilities. However, having bought a Color Computer with Extended Disk BASIC and the DMP-130 printer, I thought the calendar calculation routine would be a good program to start with. As printed, the program is intended for use with the DMP-130. You will need to alter the control codes if you are using another printer.

Since I have a Color Computer, I feel any program I write should have some color in it — even if most activity is done within the computer and output is to a printer, as is the case with this calendar program. With that in mind, I have used `CLS` along with a variety of screen colors, as the screen changes for input or instruction data. This keeps the color coming no matter what is being done.

The core of the calendar calculation is in lines 1870 through 2110. Everything else is just editing input and output. Since I am not a professional mathematician, I can't completely explain what goes on within the calendar calculation routine. I'll leave that to the professionals who understand. All I know is it works beautifully.

The program prints out three calendars per 8½-by-11 page. Each page has the current month at the top-center, the previous month on the top-left, and at the top-right, the next month. After the three calendars are printed, there are three lines available for special-event dates chosen by the user such as bill payments, holidays, meeting dates, birthdays, etc. The remainder of the calendar page is graduated by three lines showing days of the month split in two columns from 1 though 31. This allows handwritten notes or appointment dates. The program automatically moves to the next page and begins with the next sequence of three months until 12 pages have been printed.

This yearly appointment calendar makes it easy to plan activities for an entire year. Also, any future year can be set up, as well.

As the program is initiated, a year is requested. Full year figures must be entered. Since the basic core for the calendar calculation is a perpetual calendar, actually any year — past, present or future — can be used.

Once the year has been entered, press ENTER, and the screen displays instructions (lines 1220 to 1520) for any special event you might want for each calendar page of the year. Each calendar page can handle 12 special events. Only 19 characters can be entered for each special event. The screen shows the month number and the event number above a line of dashes.

As events are entered, the characters are placed directly above each dash so there is no mistake in entering more than 19 characters. You can reverse a character or the whole line by using the left arrow. If more than 19 characters are entered, the program erases the data and prints out an error message. You can return to the input area without disturbing the month number or special event count by pressing ENTER. As each event is entered into array `SPD$`, the data is erased from the screen by `GOSUB 1450`. The event count increases, and the screen is ready for the next entry. As you enter the 12th event, the program advances to the next month and the event count starts over.

In case you do not want to use all 12 event allocations for a particular calendar month, after entering the last event you want for the month, enter `END` and the program will advance to the next month number and the event count will start over. If you do not want to enter any event data or you do not want to continue with the remainder of the year, enter `SKIP`, and the screen will change to the next set of instructions.

Once all event data has been entered or skipped, the screen displays instructions to get the printer ready. Line up the top of the first page with the printer head. The program allows two blank lines before beginning to print on the third line. If not lined up properly, the page count might be off and the program will advance to the next page incorrectly.

When the paper is lined up, press ENTER, and the computer reads in all data needed for calendar calculations. The screen changes to a reminder that the program is beginning to calculate each of the three calendars for the first page. There is a brief pause before the output begins.

Since there are three different calendars for each page, I have used two loops to control all calculations for each month. The loop in Line 1760 controls the 12 pages. The loop in Line 1770 controls the three-month variation on each page.

Conditions as to what month is calculated are controlled by `IF` statements in lines 1780 to 1820. As each `IF` statement is read, month and year changes are made. The program then branches (`GOSUB 1850`) to begin entering, in array

---

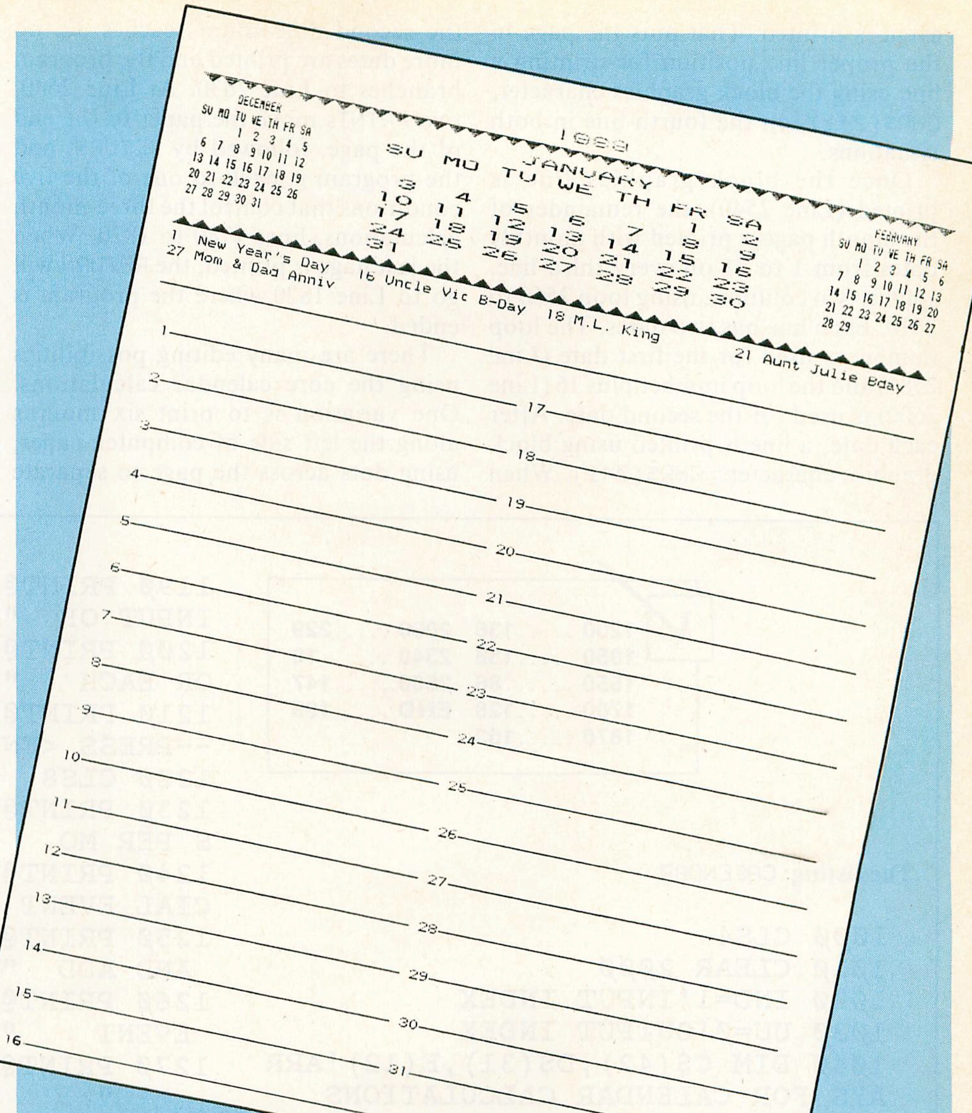
*William Holdorf lives in Albuquerque, New Mexico. He is a retired business manager and has recently begun learning about the computer.*

`CAL$`, the name of the calendar month and titles for the days of the week. This is followed by the calendar calculation routine (lines 1870 to 2110), as indexed by `IND`.

Six lines for weeks are allowed for each month, even though not all will contain a full week of dates; it depends on the month/year being calculated. Some months with 31 days require six lines to complete the calendar.

Another variation is the page for January, which requires December of the previous year. Line 1780 conditions the data accordingly. Also, another month/year change occurs when the last page, December, is reached. The next month is January of the following year, and Line 1820 conditions the data followed by `END` after calendar page output. For all other months, the calculations are controlled by lines 1790 to 1810, representing the three months' variation on each page that are all within the same year.

As the calculation data for each week of the three months is completed, array index `IND` is increased by one before returning to the month/year control (lines 1780 to 1820). After the third month has been completed for a page, the data in calendar array `CAL$` is ready to be printed. This is initiated by `GOSUB 2130` in Line 1810 or, if it is the last page month of the year, Line 1820.



```
DECEMBER                    1988
SU MO TU WE TH FR SA        SU MO TU WE TH FR SA         FEBRUARY
       1  2  3  4  5              JANUARY                SU MO TU WE TH FR SA
 6  7  8  9 10 11 12                          1  2           1  2  3  4  5  6
13 14 15 16 17 18 19         3  4  5  6  7  8  9         7  8  9 10 11 12 13
20 21 22 23 24 25 26        10 11 12 13 14 15 16        14 15 16 17 18 19 20
27 28 29 30 31              17 18 19 20 21 22 23        21 22 23 24 25 26 27
                            24 25 26 27 28 29 30        28 29
                            31
1 New Year's Day     16 Uncle Vic B-Day     18 M.L. King
27 Mom & Dad Anniv                                        21 Aunt Julie Bday
1                     17
2                     18
3                     19
4                     20
5                     21
6                     22
7                     23
8                     24
9                     25
10                    26
11                    27
12                    28
13                    29
14                    30
15                    31
16
```

With Line 2130, the output to the printer begins. Since I have used condensed characters for the previous and next months, and elongated characters for the present page month, the `TAB` cannot be used when changing character styles back and forth on the same print line. Instead, I had to use more elaborate print head controls (lines 2290 and 2340) in order to position each calendar line correctly. This will vary with each printer, and the program will have to be revised according to the user's printer. The program is designed for the DMP-130.

I begin each page printout with the year (lines 2150 to 2180). Since the elongation of the year is only one character style change on the same line, I can use the `TAB` 2150 to position the year. Next it is followed by a block graphics border (lines 2190 to 2220).

The output of the calendar lines from array `CAL$` is controlled by the loop in lines 2240 to 2370. The condensed character style is first initiated in Line 2230 before entering the loop, since the first and third calendar lines will be in that style. Once in the loop, the last calendar line (next month), will be in condensed style and ready for the previous month on return of the carriage and line feed. Each output from array `CAL$` is indexed by `UU` (lines 2260 and 2320) and the loop control `I` on the basis of eight increments. The index is returned to zero after completing each full page line. Each calendar will always contain data for eight lines as it was entered. That is, name of month, (first line), name of days of the week, (second line), and six lines for calendar weekly dates.

Once all three calendars have been printed, a block graphics border is again printed (lines 2390 to 2410). Next, the index control, `IND`, used to enter calendar calculations to array `CAL$`, is restored in Line 2430. This sets the array/index for the input of the next page of three calendars.

After the block graphics border, the loop in lines 2460 to 2520 will print three lines of any special event dates in array `SPD$`. In order to determine if there are any, Line 2470 tests the first index of the month of the array for a blank, using page month number (`MZ`) and loop number (`SE`) as the first array index. If the first index is blank, there are none in the entire array for that month, and the program will advance four blank lines and skip the loop routine by branching to Line 2530.

The reason for the four lines when there are no special event dates in array `SPD$` is that the block graphics border printout must be on the fourth line after the calendar output in order to keep the page count correct. When the array `SPD$` has data and the special event dates are printed, only three lines are used, but a carriage/line feed (2510) is always executed after the last special event is printed. That puts the page in the proper line position for printing a line using the block graphics character, `CHR$(241)`, on the fourth line in both situations.

Once the block graphics line is printed (Line 2540), the remainder of the month page is printed with monthly dates from 1 to 31 on every third line, split in two columns, using loop 2560 to 2610. Each line has two dates. The loop number is used for the first date (Line 2580) and the loop number plus 16 (Line 2600) is used for the second date. After each date, a line is printed using block graphics characters, `CHR$(241)`. When the second date count reaches 32, no more dates are printed and the program branches to Line 2630. At Line 2640, two `PRINT`s move the paper to the end of the page, followed by `RETURN`, and the program is back to one of the five conditions that control the three-month calculations, lines 1780 to 1820. When the last page is printed, the `RETURN` will go to Line 1820 where the program is ended.

There are many editing possibilities using the core calendar calculations. One variation is to print six months along the left side of computer paper, using dots across the page to separate each month and using two pages for the year. This allows random notes to be written opposite each month.

I hope this program brings as much enjoyment and interest to the user as it has to me. Now that you can have a computer-generated, full-year appointment calendar, there should be no excuse for missing important dates during the year. In fact, you can start planning years ahead.

*(Questions or comments may be directed to the author at 3501 Atrisco NW, #3-05, Albuquerque, NM 87120. Please enclose an SASE when writing for a reply.)* ☐

✓

| | | | |
|---|---|---|---|
| 1200 | .....136 | 2090 | .....229 |
| 1350 | .....186 | 2340 | .......10 |
| 1550 | .......86 | 2500 | .....147 |
| 1700 | .....128 | END | .....169 |
| 1870 | .....103 | | |

**The listing:** `CALENDAR`

```
1000 CLS4
1010 CLEAR 2000
1020 IND=1'INPUT INDEX
1030 UU=0'OUTPUT INDEX
1040 DIM C$(42),D$(31),E(12)'ARR
AYS FOR CALENDAR CALCULATIONS
1045 DIM M$(12)'ARRAY TO HOLD MO
NTH NAMES
1050 DIM CAL$(288)'ARRAY TO HOLD
 3 CALENDARS
1060 DIM SPD$(12,12)'ARRAY FOR S
PECIAL EVENTS
1070 PRINT@37," APPOINTMENT CALE
NDAR ";
1080 PRINT@174," BY ";
1090 PRINT@233," BILL HOLDORF ";
1100 PRINT@300," 1-4-86 ";
1110 FOR X=1 TO 2000:NEXT X
1120 CLS3
1130 PRINT@37," APPOINTMENT CALE
NDAR ";
1140 PRINT@105," FOR ANY YEAR ";
1150 PRINT@196," INPUT FULL YR F
IGURES  ";
1160 PRINT@228," FOR BC USE MINU
S SIGN  ";
1170 PRINT@260," E.G.  1986,1000
,10,-50 ";
1180 PRINT@320:PRINT@328,"WHAT Y
EAR";:INPUT Y
1190 PRINT@387," WHEN READY FOR
INPUT OF  ";
1200 PRINT@419," SPECIAL DATES F
OR EACH   ";
1210 PRINT@448:PRINT@452,"MONTH-
--PRESS <ENTER>";:INPUT AN$
1220 CLS8
1230 PRINT@34," 12 SPECIAL EVENT
S PER MO.  ";
1240 PRINT@66," 19 SPACES EA.SPE
CIAL EVENT ";
1250 PRINT@131," START WITH DATE
 AND ADD  ";
1260 PRINT@163," NAME OF SPECIAL
 EVENT    ";
1270 PRINT@230,"      EXAMPLES
   ";
1280 PRINT@262," 10-HARRY JOHNSO
N-BD ";
1290 PRINT@294," 25-CHRISTMAS
   ";
1300 PRINT@326," 30-CLUB PICNIC
   ";
1310 REM----INPUT SPECIAL EVENTS
 FOR ALL MONTHS
1320 FOR MON1=1 TO 12
1330 GOSUB 1450
1340 FOR SE=1 TO 12
1350 PRINT@389," MONTH:";:PRINT
USING"##";MON1;:PRINT"         S.E.
#";:PRINT USING"##";SE;:PRINT" "
;
1360 PRINT@421,;:INPUT AN$
1370 IF LEN(AN$)>19 THEN GOTO 14
80
1380 IF AN$="END"THEN 1430'IF SP
ECIAL EVENTS LESS THAN 12 GO TO
NEXT MONTH
1390 IF AN$="SKIP" THEN 1530'TO
SKIP ALL OR REMAINDER OF MONTHS
1400 SPD$(MON1,SE)=AN$
```

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```
1410 GOSUB 1450
1420 NEXT SE
1430 NEXT MON1
1440 GOTO 1530
1450 PRINT@416
1460 PRINT@448,"       ---------
----------"
1470 RETURN
1480 PRINT@417,"DATA OVER 19--PR
ESS <ENTER>";
1490 INPUT AN2$
1500 GOSUB 1450
1510 GOTO 1360
1520 REM----END SPECIAL EVENTS
1530 CLS5
1540 PRINT@261," INPUT DATA COMP
LETED ";
1550 PRINT@387," MOVE PAPER TO F
IRST LINE ";
1560 PRINT@451," WHEN READY PRES
S <ENTER> ";
1570 AN$=INKEY$:IF AN$="" THEN 1
570
1580 FOR I=1 TO 31
1590 READ D$(I)
1600 NEXT I
1610 FOR I=1 TO 12
1620 READ E(I)
1630 NEXT I
1640 FOR I=1 TO 12
1650 READ M$(I)
1660 NEXT I
1670 DATA "  1","  2","  3","  4
","  5","  6","  7","  8","  9",
" 10"," 11"," 12"," 13"," 14","
15"," 16"," 17"," 18"," 19"," 20
"," 21"," 22"," 23"," 24"," 25",
" 26"," 27"," 28"," 29"," 30","
31"
1680 DATA 31,28,31,30,31,30,31,3
1,30,31,30,31
1690 DATA "        JANUARY","
    FEBRUARY","         MARCH","
         APRIL","          MAY",
"         JUNE","         JULY",
"        AUGUST","       SEPTEMB
ER"
1700 DATA "        OCTOBER","
    NOVEMBER","       DECEMBER"
1710 CLS6
1720 PRINT@258," CALENDAR CALCUL
ATIONS AND ";
1730 PRINT@358," OUTPUT TO PRINT
ER ";
1740 REM----BEGINNING CALENDAR R
OUTINE
1750 REM----BEGINNING 3 MONTH CA
LENDAR CONTROL
1760 FOR MZ=1 TO 12
1770 FOR CAL=1 TO 3
1780 IF CAL=1 AND MZ=1 THEN MZ=1
2:Y=Y-1:GOSUB 1850:MZ=1:Y=Y+1:NE
XT CAL
1790 IF CAL=1 AND MZ=>2 THEN MZ=
MZ-1:GOSUB 1850:MZ=MZ+1:NEXT CAL
1800 IF CAL=2 AND MZ=>1 THEN GOS
UB 1850:NEXT CAL
1810 IF CAL=3 AND MZ=<11 THEN MZ
=MZ+1:GOSUB 1850:MZ=MZ-1:GOSUB 2
130:NEXT MZ
1820 IF CAL=3 AND MZ=12 THEN MZ=
1:Y=Y+1:GOSUB 1850:MZ=12:Y=Y-1:G
OSUB 2130:END
1830 REM----END 3 MONTH CALENDAR
 CONTROL
1840 REM----BEGINNING CALENDAR C
ALCULATION ROUTINE
1850 CAL$(IND)=M$(MZ):IND=IND+1'
NAME OF MONTH
1860 CAL$(IND)=" SU MO TU WE TH 
FR SA":IND=IND+1
1870 J=367*Y-INT(7*(Y+INT((MZ+9)
/12))/4)+INT(275*MZ/9)+1721031
1880 K=0
1890 IF MZ<2 THEN K=-1
1900 J=J-INT(3*(INT((Y+K)/100)+1
)/4)
1910 K=E(MZ)
1920 IF MZ<>2 THEN 1990
1930 W=INT(Y-100*INT(Y/100))
1940 X=INT(Y-4*INT(Y/4))
1950 Z=INT(Y-400*INT(Y/400))
1960 IF X<>0 THEN 1990
1970 IF W=0 AND Z<>0 THEN 1990
1980 K=29
1990 X=J-7*INT(J/7)
2000 FOR I=1 TO 42
2010 C$(I)="   "
2020 NEXT I
2030 FOR I=1 TO K
2040 C$(I+X)=D$(I)
2050 NEXT I
2060 FOR I=1 TO 6
2070 J=7*I
2080 REM----WEEKLY DATES INPUTED
 TO ARRAY
2090 CAL$(IND)=C$(J-6)+C$(J-5)+C
$(J-4)+C$(J-3)+C$(J-2)+C$(J-1)+C
$(J):IND=IND+1
2100 NEXT I
2110 RETURN
2120 REM----END CALENDAR ROUTINE
2130 REM----OUTPUT TO PRINTER
2140 PRINT#-2:PRINT#-2
2150 PRINT#-2,TAB(35);
2160 PRINT#-2,CHR$(27)CHR$(14);'
```

```
START ELONGATION
2170 PRINT#-2,Y
2180 PRINT#-2,CHR$(27)CHR$(15);'
END ELONGATION
2190 FOR I=1 TO 40
2200 PRINT#-2,CHR$(253)CHR$(251)
;
2210 NEXT I
2220 PRINT#-2
2230 PRINT#-2,CHR$(27)CHR$(20);'
CONDENSED
2240 FOR I=1 TO 8
2250 PRINT#-2,CAL$(I+UU);
2260 UU=UU+8
2270 PRINT#-2,CHR$(27)CHR$(19);'
STANDARD
2280 PRINT#-2,CHR$(27)CHR$(14);'
START ELONGATION
2290 PRINT#-2,CHR$(27);CHR$(16);
CHR$(0);CHR$(110);
2300 PRINT#-2,CAL$(I+UU);
2310 PRINT#-2,CHR$(27)CHR$(15);'
END ELONGATION
2320 UU=UU+8
2330 PRINT#-2,CHR$(27)CHR$(20);'
CONDENSED
2340 PRINT#-2,CHR$(27);CHR$(16);
CHR$(3);CHR$(45);
2350 PRINT#-2,CAL$(I+UU)
2360 UU=0
2370 NEXT I
2380 PRINT#-2,CHR$(27)CHR$(19);'
STANDARD
2390 FOR G=1 TO 40
2400 PRINT#-2,CHR$(252);CHR$(254
);
2410 NEXT G
2420 PRINT#-2
2430 IND=1
2440 REM----END CALENDAR OUTPUT
2450 REM----OUTPUT MONTHLY SPECI
AL EVENTS
2460 FOR SE=1 TO 9 STEP 4
2470 IF SPD$(MZ,SE)=" "THEN PRIN
T#-2:PRINT#-2:PRINT#-2:PRINT#-2:
GOTO 2530
2480 PRINT#-2,SPD$(MZ,SE);
2490 PRINT#-2,TAB(20);SPD$(MZ,SE
+1);
2500 PRINT#-2,TAB(40);SPD$(MZ,SE
+2);
2510 PRINT#-2,TAB(60);SPD$(MZ,SE
+3)
2520 NEXT SE
2530 REM----END SPECIAL EVENTS
2540 PRINT#-2,STRING$(80,(CHR$(2
41)))
2550 REM----BEGINNING DATE/LINES
 OUTPUT
2560 FOR DT=1 TO 16
2570 PRINT#-2:PRINT#-2
2580 PRINT#-2,USING"##";DT;:PRIN
T#-2,STRING$(37,(CHR$(241)));
2590 IF DT+16=32 THEN 2630
2600 PRINT#-2,TAB(40);:PRINT#-2,
USING"##";DT+16;:PRINT#-2,STRING
$(37,(CHR$(241)))
2610 NEXT DT
2620 REM----END DATE/LINE OUTPUT
2630 REM----MOVE TO END OF PAGE
2640 PRINT#-2:PRINT#-2
2650 RETURN'READY FOR NEXT PAGE
AND NEXT 3 MONTHS
```

**PRINTERS!**

| | |
|---|---|
| NEW! Okidata 192+ (Par. or Ser.) | $370 |
| NEW! Okidata 193 (Parallel) | $540 |
| NEW! Okidata 193+ (Serial) | $610 |
| Okimate 20 Color Printer | $135 |
| Fujitsu 2100 (80 col.) | $410 |
| Fujitsu 2200 (132 col.) | $520 |
| Toshiba 321 (Par. or Ser.) | $510 |
| Qume Letterpro 20 (Letter Qual.) | $445 |
| Silver Reed 420 (Daisy Wheel) | $240 |
| Silver Reed 600 (Daisy Wheel) | $575 |

(Add $10 Shipping for Printers)

**ACCESSORIES!**

| | |
|---|---|
| Taxan 12" Green Monitor | $125 |
| Taxan 12" Amber Monitor | $135 |
| Table Top Printer Stand w/Slot (80 col.) | $30 |
| Table Top Printer Stand w/Slot (132 col.) | $45 |
| Stand w/Diskette Storage (80 col.) | $47 |
| Stand w/Diskette Storage (132 col.) | $57 |

Other Printers, Monitors, and Accessories for CoCo and IBM upon request.

$15 off interface with purchase of printer.

Find your cheapest published price and we'll beat it!!!

**DISK DRIVE SYSTEMS!**

ALL ½ HEIGHT DOUBLE SIDED

| | |
|---|---|
| Drive 0 (addressed as 2 drives!) | $235 |
| Drive 0,1 (addressed as 4 drives!) | $350 |

**All above complete with HDS controller, cable, & drive in case with power supply**

| | |
|---|---|
| Bare Double Sided Drives | $109 |
| Dual ½ Height Case w/Power Supply | $49 |
| Double Sided Adapter | $25 |
| HDS Controller, RS ROM & Instructions | $99 |
| 25 CDC DS/DD Diskettes | $32 & $3 s/h |

We use the HDS controller exclusively. Can use 2 different DOS ROM's.
Shipping Costs: $5/drive or power supply, $10 max.
Co Co Serial Cables 15 ft.—$10. Co Co/RS-232 Cables 15 ft.—$20.
Other cables on request. (Add $3.00 shipping)

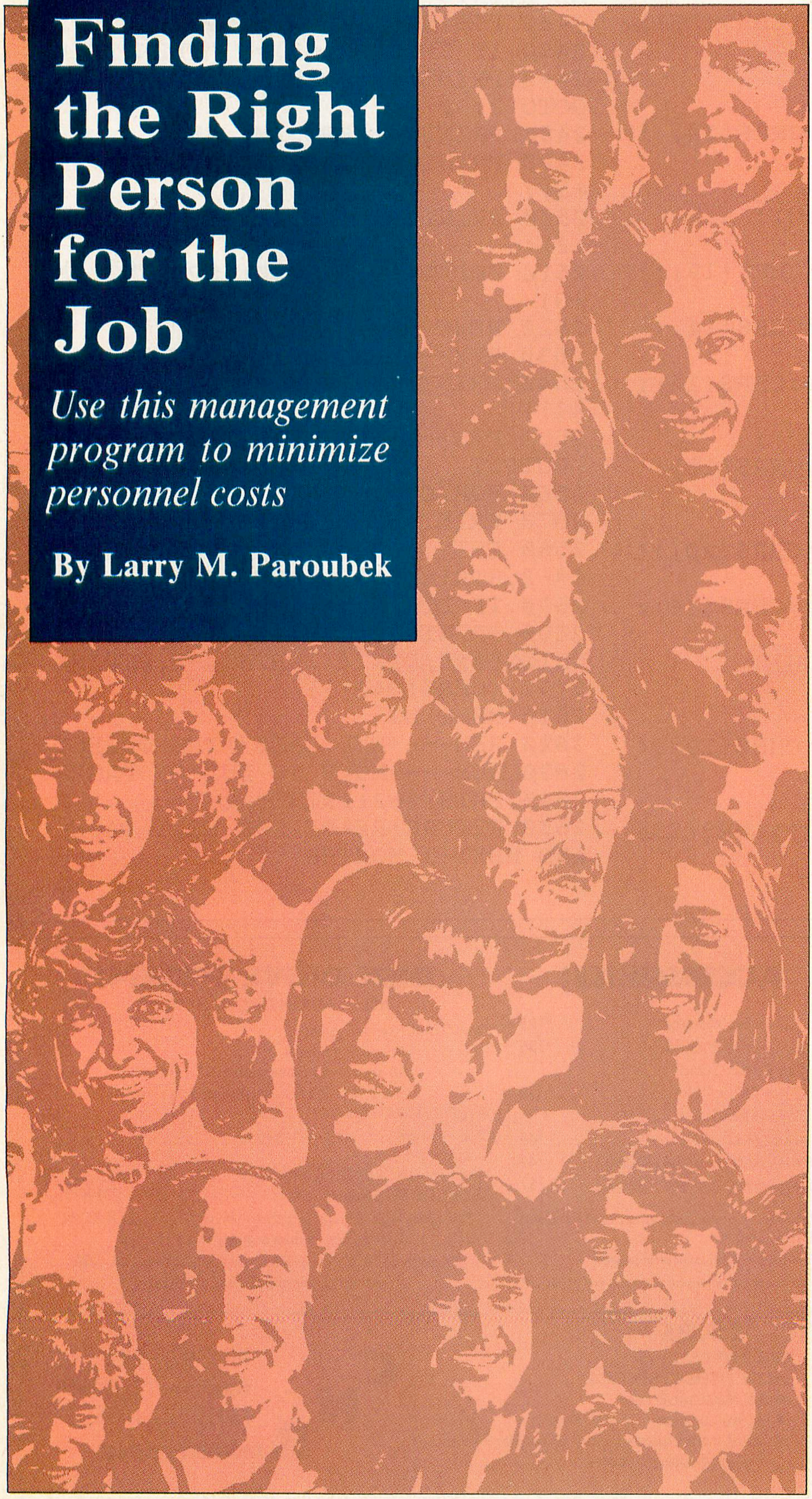
**CLOSEOUT* $29.95**

SP-2 INTERFACE for EPSON PRINTERS:
- 300-19,200 BAUD rates
- Fits inside printer — No AC Plugs
- Optional external switch ($5.00 extra) frees parallel port for use with other computers

*While Supplies Last

SP-3 INTERFACE for MOST OTHER PRINTERS:
- 300-19,200 BAUD rates
- External to printer — No AC Plugs
- Built in modem/printer switch—no need for Y-cables or plugging/unplugging cables

CNR ENGINEERING
P.O. Box 293
Raritan, NJ 08869
(201) 722-1055



# Finding the Right Person for the Job

*Use this management program to minimize personnel costs*

**By Larry M. Paroubek**

Anyone who has been in business for any length of time realizes that, above all else, employees tend to make or break a company. We often hear phrases such as, "They're a dime a dozen," or, "Anyone is replaceable" — but what is the real cost, in both money and time, of finding and keeping good employees?

*Job Description* was created as a management tool to help in minimizing the various costs involved in hiring, training and, in many cases, firing personnel.

After the title screen runs, you are asked if you want the speed-up poke or not; if you have any difficulties with the poke, press N. The poke does not make a substantial difference in the program's operating speed.

You will then be asked to enter the title of the job you are creating the description for. Just type in the title. Whenever you are asked for input in the program, just type in an appropriate response. When dollar amounts are mentioned, type in just the whole number amounts (no dollar signs or decimal points). When hours are requested, enter whole numbers (no decimal points or fractional amounts).

Next, you are asked for the number of primary responsibilities the job demands; just press a number. Then type in short descriptions of the responsibilities, pressing ENTER after each. Then you are prompted to rate the responsibilities on a scale of 1 to 9 (9 being high), in order to establish priorities.

Most positions have no more than five primary responsibilities. If you have a great many more than that, perhaps you are overloading the employee or are listing secondary aspects of the prime responsibilities. I have intentionally left printer wrap-arounds out of this program — your responses should be short and specific.

You will be asked to define the personality type you feel is necessary for the position. Introverts and extroverts do not cover the spectrum of personal-

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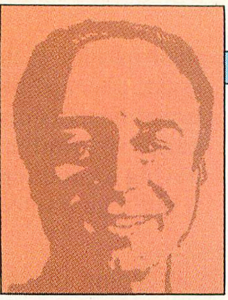
*Larry Paroubek is an Atlantic City, New Jersey, CoCoist who works in personnel administration and acts as a management consultant with M.I.S. Systems.*



ity types, but, as generalizations, they do help in defining the position's needs. Note that we all tend toward one personality type or the other. Being introverted is not bad — positions that warrant little supervision or positions such as in research and development need a more introspective, introverted type of personality. Customer service and sales positions tend toward a more extroverted type of personality.

Three examples of more specific types of personalities (utilizing Carl Jung's personality breakdowns) are presented. Read the specifics on each and press the number that corresponds to what you feel is the primary personality requirement for the position offered (Thinker, Sensor, Intuitor or Feeler). Then list your second and third choices. Though we are a combination of all of the above, we tend more toward one type than another. And each position needs a slightly different type of personality.

Next you are asked to list five primary duties of the position and to estimate the number of hours it will take to accomplish each duty on a weekly basis. Notice there is a "trap" that tells us when we have made the position "undoable." It is undoable if you have 90 hours of work to accomplish in 40 hours. With such things, we have to be realistic. If all we create is frustration, the employee will not be with us for very long!

Input to whom the employee will be directly reporting. Notice there is only one choice. An employee should be directly subordinate to only one person. The employee will avoid conflicting requirements and the supervisor will know exactly what is going on with the individual. (We all can remember when Father said "no" to something — so we went to ask Mother!)

You are then asked if your subject is part of management. If so, then list the number of people subordinate to that individual. Remember, it is normally suggested that no more than eight to 10 people be directly subordinate to any one individual. Often, as in the case of retail management when the manager is also required to sell, it is best to have even less employees directly subordinate. If there are not enough hours in the day to allot time to each task and individual, the job will not get done!

> *"Putting a person who doesn't 'fit' into a position is much like trying to hammer a nail with a saw!"*

Determine the salary range and whether or not it is flexible. Flexibility of salary is often a primary requirement to the most qualified individuals.

After you answer yes or no to the question of flexibility, the program is printed out. Be sure to have your printer on and ready. If you have any specific printer codes for your printer, they go in lines 1000 through 1030.

The space left open for printer codes is there for you to develop your own format for the printout. Since there are a variety of printers set at various baud rates, it is best that you utilize your own special codes. If you developed notes before running the program, entering the data is much easier, and your presentation will be much more organized.

**Outline of Management Success**

To maximize use of the printout, you should consider these factors:

A) Did you search out as much information as possible from as many sources as possible so that you have a concise and well-formulated job description?

- Did you review the responsibilities of the person who formerly held the position, how well he or she accomplished the task, in what aspects he or she lacked the ability to perform the job and why, and, most importantly, what type of person (personality) he or she is?
- Did you discuss with the supervisor exactly what the position requires?
- If you have hired before for the position and the individual was not well-suited for it, how did you learn from your mistakes?
- When you were listing requirements, did you put too much of your own biased thoughts and personality into each requirement, or did you really try to maintain an objective viewpoint?
- Did you fully research all possible aspects of the position?

B) Did you review the company itself from both a reputation standpoint and from a company-needs, stage of development standpoint?

- All companies are in some stage of development. Because of their organizational development, they have different needs at different stages.

*Start-up*: To survive, a company at this stage must have strong leadership and people with a high degree of flexibility.

*Development*: The company begins to define its operating mores, structure and roles of its employees. Product development and sales are emphasized. Crises are created because of individual loss of autonomy.

*Consolidation*: A period in which the organization considers its gains and losses. It looks into further development while consolidating its present position. This period needs strong direction.

*Plateau*: Little or no change is evident. Perhaps no new ideas or proposals are generated, or skills are not available. If alternate strategies are not developed, the company may lose its edge in the market.

*Expansion*: The company expands

```
                         -JOB  DESCRIPTION-

POSITION : COPY EDITOR

REPORTS TO : MANAGING EDITOR

SALARY RANGE :   FLEXIBLE


STAFF SIZE :  2  PERSONS

PARTICULAR DUTIES :
             EDIT SUBMISSIONS AND HAVE TYPESET
                  20  HRS./WK.
             PROOFREAD EACH ARTICLE BEFORE PASTE-UP
                  10  HRS./WK.
             WRITE INHOUSE COPY (ADS,HEADLINES, ETC.)
                  5  HRS./WK.
             ANSWER CORRESPONDENCE/CALLS
                  5  HRS./WK.
             PROOFREAD ARTICLES AFTER PASTE-UP
                  10  HRS./WK.
           * Job, as listed, is undoable at  50  hours per week total

POSITIONAL RESPONSIBILITIES :
      HIGH -> EDIT/WRITE COPY FOR EACH ISSUE
      HIGH -> DIRECT COPY THROUGH ALL STAGES OF PRODUCTION
      HIGH -> ENSURE ACCURACY AND STYLE CONFORMITY OF EACH ARTICLE
    MEDIUM -> ASSIST MANAGING EDITOR WITH PRODUCTION TASKS

We are looking for someone that is most happy working alone
and does not need a social environment in which to work.

 1 . We want a person that enjoys tackling problems with logic
  is strong on analysis, a methodical worker and good at research.
  Will be good with facts and figures; and, analysis.

 2 . We want someone that enjoys playing with ideas and theories,
  can see the overview, is creative and imaginative.
  Good with long-term planning, lateral thinking and is intuitive.

 3 . We want someone that is good at getting things done,
  enjoys routine work, has common sense, works hard and is practical.
  Good at initiating projects, negotiating, converts ideas/action.
```

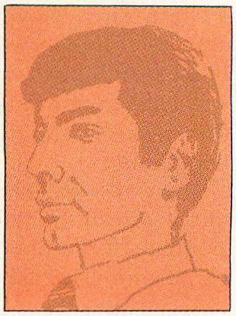
with development, introduction or modification of products, etc., or by acquisition. Direction, leadership and new ideas are beneficial.

*Declining*: Rising costs, outdated products, etc., cause the company to decline. Flexibility, direction and firing excess personnel are imperative or the company will be forced out of business.

- Attracting the highest quality applicants is imperative. A company's reputation will often determine the quality of its applicants for various positions. The better the reputation, the higher their quality. If the reputation is not so good, perhaps higher salaries or additional benefits may bring quality applicants to your company. Of course, having a good reputation at the present is not a guarantee for the future.

Keeping all these factors in mind and using them to your best advantage will help you build the best possible job description on your expectations for the position you want to fill. It seems no matter how good our systems for hiring are, we tend to do no better than about 50 percent in our success-to-failure ratios. Anything that increases the percentage of successes will be beneficial in time, money and satisfaction.

Of course, realizing what you and your company actually need in a certain position is only a beginning. Interviewing, training/developing, motivational factors, etc., all play their roles. Creating job descriptions only helps you see what you need. You have to create your own paths. Putting a person who doesn't "fit" into a position is much like trying to hammer nails with a saw! Your success ratios won't be very good, there's too much effort involved and it's hard on the saw.



*(Questions or comments may be directed to the author at 42 South Windsor, Atlantic City, NJ 08401. Please enclose an SASE when requesting a reply.)* ☐

*Editor's Note: This program is written on the Korean CoCo 3. Pokes are used that allow true lowercase letters, but many of the older CoCos do not allow this. For 16K CoCos with Extended Color BASIC, type* PCLEAR2 *before running the program to eliminate difficulties. For the older CoCo's, eliminate* POKE 65314,40 *and* POKE65314,48 *in the following lines: 170, 280, 330, 500, 560, 910, 920, 1500, 1630, 1650. Line 1650 contains two of these pokes.*

| | | | |
|---|---|---|---|
| 170 | 60 | 1280 | 184 |
| 280 | 138 | 1380 | 230 |
| 360 | 77 | 1530 | 219 |
| 550 | 207 | END | 139 |
| 1120 | 132 | | |

**The listing:** JOB DESC

```
1 ' JOB-DESC
2 ' LARRY M. PAROUBEK
3 ' COPYRIGHT (C) 1986
4 ' ALL RIGHTS RESERVED
10 CLS:GOSUB1600
20 CLEAR1000
100 CLS:TITLE$="-CREATING JOB DE
SCRIPTION-":PRINT@2,TITLE$
110 PRINT@96," WHAT IS THE JOB T
ITLE":PRINT:INPUT TT$
150 CLS:PRINT@2,TITLE$
160 PRINT@129,"Overview the posi
tion and input the number of res
ponsibilities  of the position."
:PRINT@264,"<MAXIMUM OF NINE>":P
RINT@384," Think of responsibili
ty items      that must be handled
on a          daily, weekly or mont
hly basis. -positional-";
170 POKE65314,48:I$=INKEY$:IFI$=
""THEN170 ELSE IF VAL(I$)<1 OR V
AL(I$)>9 THEN170
180 RESPONSIBLE=VAL(I$)
190 FORX=1 TO RE:CLS:PRINT@2,TIT
LE$:PRINT:PRINT:PRINT" LIST RESP
ONSIBILITIES           -BE SPECI
FIC!-":PRINT:PRINT:LINEINPUTA$(X
):NEXTX
200 FORX=1 TO RE:CLS:PRINT@34,"R
ATE RESPONSIBILITIES 1 -9":PRINT
@66,"9 IS HIGH, 1 IS LOW":PRINT@
256,"* ";A$(X)
210 PRINT@420,"<INPUT 1 - 9>"
220 I$=INKEY$:IFI$=""THEN220 ELS
EIF VAL(I$)<1 OR VAL(I$)>9 THENP
RINT@352," OFF SCALE - TRY AGAIN
...":GOTO220 ELSE230
230 A(X)=VAL(I$):NEXTX
250 CLS:PRINT@1,"WHAT TYPE OF PE
RSONALITY DO YOU FEEL YOU NEED?"
260 PRINT@128,"1. INTROVERT - MO
ST HAPPY BY    THEMSELVES, DOING
 THEIR OWN     THING...
270 PRINT@256,"2. EXTROVERT - IN
TERACTION WITH OTHERS GIVES THEI
R LIFE MEANING."
280 PRINT@420,"<INPUT 1 OR 2>":P
OKE65314,48
290 I$=INKEY$:IFI$=""THEN290ELSE
IF VAL(I$)<1 OR VAL(I$)>2THEN290
 ELSE PERSON=VAL(I$)
300 CLS:PRINT@1,"RATING INDIVIDU
AL'S STRENGTH   -WHERE DO YOU NE
ED THE STRENGTH-"
310 PRINT@96,"1. THINKER : Good
with facts andfigures, researchi
ng, analysis, accounting, etc.":
PRINT"2. SENSOR : Good at initia
ting projects, negotiating, con
verts ideas into action."
320 PRINT"3. INTUITOR : Good at
long-term planning, creative wri
ting,     lateral thinking, brai
nstorming.";:PRINT"4. FEELER : G
ood at cementing   relationships
, counseling,      public relati
ons.":PRINT@481,"<RATE MOST IMPO
RTANT FIRST>";
330 FORX=1 TO3:POKE65314,48
340 I$=INKEY$:IFI$=""THEN340 ELS
EIF VAL(I$)<1 OR VAL(I$)>4 THEN3
40 ELSE350
350 IF X=1 THEN N1=VAL(I$) ELSE
IFX=2 THEN N2=VAL(I$) ELSEIF X=3
 THEN N3=VAL(I$)
360 IF X=1 THEN390 ELSEIFX=2THEN
```

Still keeping the books the way Grandpa did?

*Then you need CoCo-Accountant*

Tired of scrounging through old shoeboxes full of receipts, canceled checks and bills? Looking for an easy way to organize your finances when the tax man calls? Then you need **CoCo-Accountant,** the best-selling home and small business accounting program for the Color Computer. All you have to do is set up a chart of accounts and begin entering transactions. Checks, credit card expenses, income. In any order. **Just toss it in and CoCo-Accountant sorts it out.** No fuss, no muss, no mess.

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Here's what it can do for you:

- ⇨ List and total expenses and income by **month.**
- ⇨ List and total expenses and income by **account,** for any month or the whole year.
- ⇨ List and total expenses or income by **payee or income source** for any month or the whole year.
- ⇨ Track, list and summarize **tax-deductible expenses.**
- ⇨ Track, list and summarize expenses subject to **sales tax.** Even calculates total sales tax you paid!
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- ⇨ **Balance your checkbook**, of course!
- ⇨ Sort entries by date and store files on tape or disk.
- ⇨ Up to 900 entries in a single file.
- ⇨ **Requires 64K CoCo or Coco 3.**

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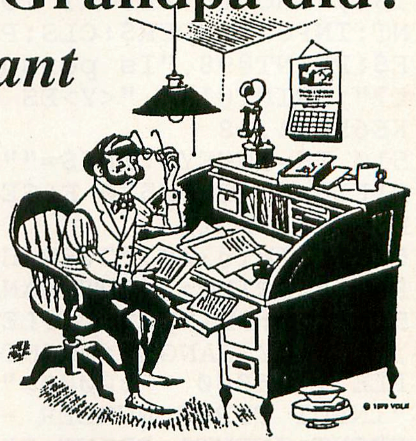


```
370 ELSE380
370 IF N2=N1 THEN340 ELSE390
380 IF N3=N1 OR N3=N2 THEN340 EL
SE390
390 TYPE(X)=VAL(I$):FORY=1504 TO
1535:POKEY,255:NEXTY:IF X=1 THEN
 PRINT@481,"<RATE SECOND MOST IM
PORTANT>"; ELSEIF X=2 THEN PRINT
@481,"<RATE THIRD MOST IMPORTANT
>";
400 NEXTX
450 CLS:PRINT@2,TITLE$:PRINT@72,
" JOB DUTIES":PRINT@416," LIST 5
 MAJOR DUTIES THAT YOU    FEEL T
HE POSITION ENTAILS.";:PRINT@103
,"<maximum of 5>":FORX=1 TO5:PRI
NT@162,"NUMBER ";X:PRINT:LINEINP
UT DUTIES$(X):FORY=1248 TO1311:P
OKEY,143:NEXTY,X
460 CLS:PRINT@2,TITLE$:PRINT@64,
" ESTIMATE THE NUMBER OF HOURS
  PER WEEK THAT THE PARTICULAR
  DUTY SHOULD TAKE TO COMPLETE.
  input -integers-";:FORX=1 TO5:
PRINT@225,DUTIES$(X):PRINT:INPUT
 DUTIES(X):FORY=1248 TO1311:POKE
Y,143:POKEY+64,143:NEXTY,X
470 TD=DU(1)+DU(2)+DU(3)+DU(4)+D
U(5)
500 CLS:PRINT@2,TITLE$:PRINT@100
,"REPORTING ARRANGEMENTS":PRINT@
132,"SHOULD REPORT TO WHOM?":PRI
NT:INPUT SUPER$:CLS:PRINT@2,TITL
E$:PRINT@98,"Is person managemen
t?":PRINT@134,"<Y>ES OR <N>O":PO
KE65314,48
510 I$=INKEY$:IFI$=""THEN510 ELS
EIFI$="Y"THEN520 ELSEIFI$="N"THE
N550 ELSE510
520 PRINT@320,"OVER HOW MANY PEO
PLE?":PRINT:INPUT MANAGE
550 CLS:PRINT@2,TITLE$:PRINT@102
,"SALARY RANGE":PRINT@130,"<EXAM
PLE : 25000 - 30000>":PRINT@194,
"INPUT FIRST NUMBER -> NO $'S";:
PRINT:INPUTA:PRINT:PRINT"  INPUT
 SECOND NUMBER -> NO $'S";:PRINT
:INPUTB
560 SALARY$="$"+STR$(A)+" -"+STR
$(B):PRINT@418,"FLEXIBLE ? : <Y>
ES OR <N>O";:POKE65314,48
570 I$=INKEY$:IFI$=""THEN570 ELS
EIF I$="Y" THEN FLEX$="FLEXIBLE
- YES" ELSEIF I$="N" THEN FLEX$=
"FLEXIBLE - NO" ELSE570
900 CLS3:P=PEEK(65314):IF P=4 OR
 P=48 THEN920 ELSE910
910 PRINT@260,"please";CHR$(128)
;"prepare";CHR$(128);"printer";:
POKE65314,48:FORX=1TO200:NEXTX:S
OUND1,1:GOTO900
920 FORX=1 TO12:SOUND160,1:NEXTX
:PRINT@260,"PRESS ANY KEY TO PRO
CEED";:POKE65314,40:EXEC44539
1000 'LINES 1000 - 1030 IS SPACE
     PROVIDED FOR YOUR OWN
     PARTICULAR PRINTER CODES.
1010 'PROGRAM IS WRITTEN FOR
     80 CHARACTER PER LINE
     PRINTOUT...
1020 'USE THIS AREA FOR YOUR
     PRINTER'S BAUD RATE...
1030 'USE THIS AREA FOR ANY
     SPECIAL PRINTER CODES...
1100 CLS0:PRINT@426,"working";:P
OKE65494,0:PRINT#-2,"
     -JOB  DESCRIPTION-"
1110 PRINT#-2:PRINT#-2,"       P
OSITION : ";TT$:PRINT#-2:PRINT#-
2,"       REPORTS TO : ";SUPER$:
PRINT#-2:PRINT#-2,"       SALARY
 RANGE : ";SALARY$:PRINT#-2,"
              ";FLEX$
1120 IF MANAGE >0 THEN1130 ELSE1
140
1130 PRINT#-2:PRINT#-2,"       S
TAFF SIZE : ";MANAGE;" PERSONS"
1140 PRINT#-2:PRINT#-2,"       P
ARTICULAR DUTIES : "
1150 FORX=1 TO5:PRINT#-2,"
           ";DUTIES$(X):PRIN
T#-2,"                          "
;DUTIES(X);" HRS./WK.":NEXTX
1160 IF TD>40 THEN PRINT#-2,"
             * Job, as listed
, is undoable at ";TD;" hours pe
r week total" ELSE1170
1170 PRINT#-2:PRINT#-2,"       P
OSITIONAL RESPONSIBILITIES : ":X
=0
1180 X=X+1:IF X>RE THEN1210 ELSE
1190
1190 IF A(X) >7 THEN1200 ELSE118
0
1200 PRINT#-2,"            HIGH
 -> ";A$(X):GOTO1180
1210 X=0
1220 X=X+1:IFX>RE THEN1250 ELSE1
230
1230 IF A(X) <=7 AND A(X) >4 THE
N1240 ELSE1220
1240 PRINT#-2,"          MEDIUM
 -> ";A$(X):GOTO1220
1250 X=0
1260 X=X+1:IFX>RE THEN1290 ELSE1
270
1270 IF A(X) <=4 AND A(X)>0 THEN
1280 ELSE1260
```

```
1280 PRINT#-2,"               LOW
 -> ";A$(X):GOTO1260
1290 X=0:PRINT#-2:IFPERSON=1 THE
N1300ELSE1310
1300 PRINT#-2,"   We are loo
king for someone that is most ha
ppy working alone":PRINT#-2,"
    and does not need a social e
nvironment in which to work.":PR
INT#-2:GOTO1320
1310 PRINT#-2,"   We are loo
king for someone that is a peopl
e person":PRINT#-2,"   whose
challenge is inter-action with o
ther people.":PRINT#-2
1320 X=X+1:IFX>3 THEN1500
1330 IF TYPE(X)=1 THEN1340 ELSE1
360
1340 PRINT#-2,"   ";X;". We
want a person that enjoys tackli
ng problems with logic":PRINT#-2
,"         is strong on analysis
, a methodical worker and good a
t research.":PRINT#-2,"
Will be good with facts and figu
res; and, analysis."
1350 PRINT#-2:GOTO1320
1360 IF TYPE(X)=2 THEN1370 ELSE1
390
1370 PRINT#-2,"   ";X;". We
want someone that is good at get
ting things done,":PRINT#-2,"
      enjoys routine work, has c
ommon sense, works hard and is p
ractical.":PRINT#-2,"        Go
od at initiating projects, negot
iating, converts ideas/action.
1380 PRINT#-2:GOTO1320
1390 IF TYPE(X)=3 THEN1400 ELSE1
420
1400 PRINT#-2,"   ";X;". We
want someone that enjoys playing
 with ideas and theories,":PRINT
#-2,"        can see the overvi
ew, is creative and imaginative.
":PRINT#-2,"        Good with l
ong-term planning, lateral think
ing and is intuitive."
1410 PRINT#-2:GOTO1320
1420 IF TYPE(X)=4 THEN1430 ELSE1
320
1430 PRINT#-2,"    ";X;". We
want someone that is good at cem
enting team relationships,":PRIN
T#-2,"     counseling, arbit
rating, public relations and is
perceptive.":PRINT#-2,"
Enjoys social contact and can ea
sily talk with anyone."
1440 PRINT#-2:GOTO1320
1500 CLS:PRINT@65,"Do you wish t
o print another    Job Descripti
on ?";:PRINT@260,"<Y>es  or  <N>
o";:POKE65314,48
1510 I$=INKEY$:IFI$=""THEN1510 E
LSEIFI$="Y"THEN20 ELSEIFI$="N"TH
EN1520 ELSE1510
1520 CLS:PRINT@100,"Thank you fo
r using":PRINT@164,"Creating a":
PRINT@230,"JOB DESCRIPTION":PRIN
T@330,"by":PRINT@364,"Larry M. P
aroubek":POKE65314,48:FORX=1 TO8
:PLAY"T16O2V15P16L8AP16L32AP32FP
32EDEP32CP32D":NEXTX:PLAY"T8O1L3
2CDEGBO2DFL1A"
1530 POKE65494,0:CLS:END
1600 CLS:FORX=1024 TO1055STEP2:P
OKEX,191:POKEX+1,175:POKEX+480,1
75:POKEX+481,191:NEXTX
1610 FORX=1056TO1472STEP64:POKEX
,175:POKEX+32,191:POKEX+31,175:P
OKEX+63,191:NEXTX
1620 PRINT@99,"CREATING A";:PRIN
T@200,"job  description";:PRINT@
295,"BY";:PRINT@330,"LARRY M. PA
ROUBEK";:PRINT@362,"COPYRIGHT (C
) 1986";:PRINT@394,"ALL RIGHTS R
ESERVED";
1630 POKE65314,40
1640 PLAY"T3O2V12L8P4AP8AP8AL16D
FEL8V6P8AP8AP8AL16DFEO3V16L8P8AP
8AP8AL16DFEO1V10L8P8AP8AP8AL16DF
EP8O3V18L32AP32O2AP32O1AP16O3AP3
2O2AP32O1AP8L16DFO2V26L16EE-EE-E
E-EE-L8.E"
1650 PRINT@456,"speed poke? Y/N"
;:POKE65314,48:FORX=1 TO40:NEXTX
:PRINT@456,"SPEED POKE? Y/N";:PO
KE65314,48:FORX=1 TO80:NEXTX
1660 I$=INKEY$:IFI$=""THEN1650 E
LSEIFI$="Y"THEN SP=65495 ELSEIF
I$="N"THEN SP=65494 ELSE1650
1670 POKESP,0:FORX=1024 TO1151:P
OKEX,128:NEXTX:FORX=1152 TO1535:
A=RND(3)+176:POKEX,A:NEXTX
1680 POKE1220,10:POKE1221,15:POK
E1222,2:POKE1225,4:POKE1226,5:PO
KE1227,19:POKE1228,3:POKE1229,18
:POKE1230,9:POKE1231,16:POKE1232
,20:POKE1233,9:POKE1234,15:POKE1
235,14:POKE1236,19
1690 POKE1510,16:POKE1511,18:POK
E1512,5:POKE1513,19:POKE1514,19:
POKE1516,1:POKE1517,14:POKE1518,
25:POKE1520,11:POKE1521,5:POKE15
22,25:POKE1524,97:EXEC44539
1700 RETURN
```

*Keep tax records in order*

# Preparing for Uncle Sam

**By Robert S. Schlottmann**

Some of you, if you are like me, know very little about filling out income tax forms. And what's more, you don't *want* to know very much about it. Trying to fill out those IRS forms is about as exciting as sitting in the woods and watching a log rot.

Consequently, every year around tax time I used to gather all my cancelled checks, receipts and other pertinent information from the previous year and sort it all into categories. Then I figured the totals and entered them on the form my tax accountant sent me annually, and mailed it all to him. Two or three weeks later, he would send me the completed forms and I would sign them and send them to the IRS.

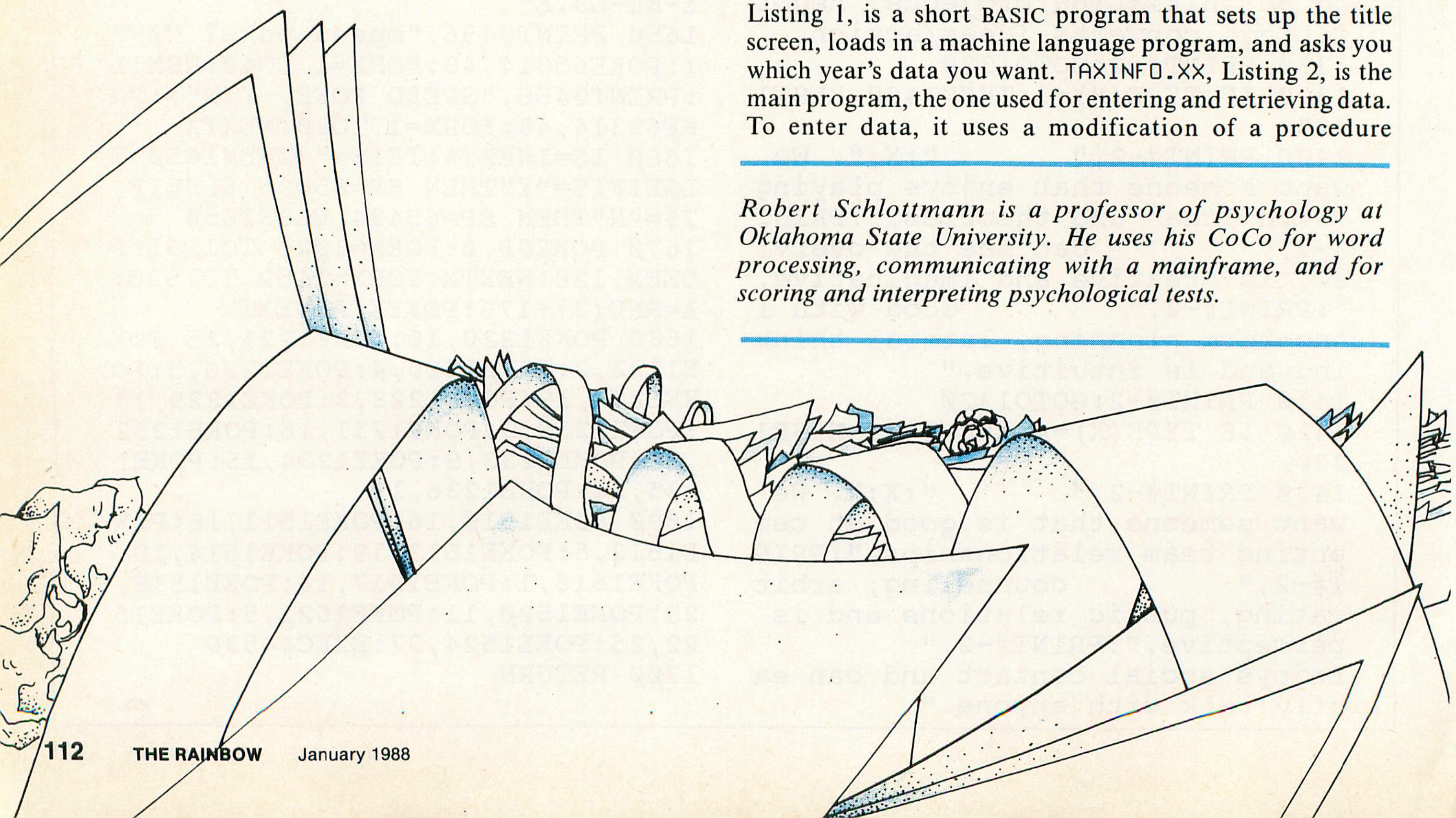
This system worked very well for me and saved me a lot of mental anguish. All I needed to know were the categories to use in sorting my records. However, three years ago, to make things even easier, I started using my Color Computer and *Tax Info* to keep the records. Now I merely enter any tax-relevant items at the end of each month and am prepared for tax time.

I can look at entries by date, name or account, and determine what each entry was for. I can look at my monthly utility bills (since I have an office in the home, I need to keep these records, too) and graph them on the screen or dump the graph to the printer. I can also very easily retrieve the records from previous years for comparison. When tax time comes, I simply tell the computer that I want a printout of all accounts, and all the individual entries with their totals are printed for each account. I then send the printout to my tax accountant. If I am ever questioned by the IRS, I will have detailed information about each entry that goes into every account total.

## The Programs

Four programs comprise *Tax Info*. `TAX.BAS`, shown in Listing 1, is a short BASIC program that sets up the title screen, loads in a machine language program, and asks you which year's data you want. `TAXINFO.XX`, Listing 2, is the main program, the one used for entering and retrieving data. To enter data, it uses a modification of a procedure

*Robert Schlottmann is a professor of psychology at Oklahoma State University. He uses his CoCo for word processing, communicating with a mainframe, and for scoring and interpreting psychological tests.*



developed by Henry Grace (*HOT CoCo*, October 1983) that creates `DATA` lines in your program for you.

`SETUP.BAS`, Listing 3, is a utility program that allows you to set up abbreviations for names, places, accounts and a number code (which I will explain later). *Tax Info* was designed to be used with `REVFIELD.BIN`, a machine language program developed by Ray Gauvreau (THE RAINBOW, August 1983) that provides inverse video (light characters on a dark screen). Ray's program also has other nice features not implemented by *Tax Info* that allow you to control printing speed and protect part of the screen from scrolling. You can avoid using `REVFIELD.BIN` altogether by deleting Line 110 in Listing 1, all `POKE 32544+54` statements in Listing 2, and by changing all `EXEC` commands to `CLS`.

### System Requirements

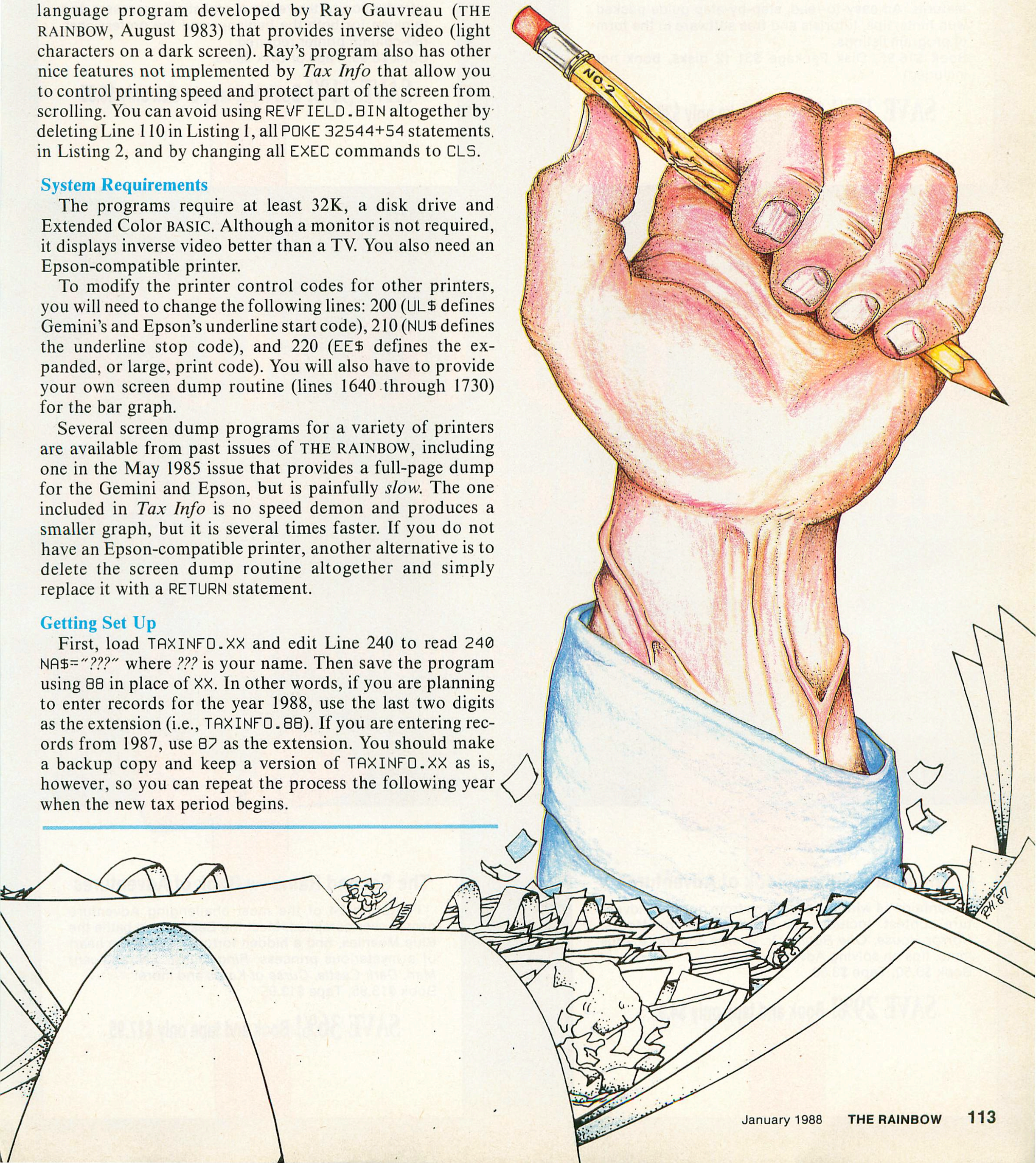
The programs require at least 32K, a disk drive and Extended Color BASIC. Although a monitor is not required, it displays inverse video better than a TV. You also need an Epson-compatible printer.

To modify the printer control codes for other printers, you will need to change the following lines: 200 (`UL$` defines Gemini's and Epson's underline start code), 210 (`NU$` defines the underline stop code), and 220 (`EE$` defines the expanded, or large, print code). You will also have to provide your own screen dump routine (lines 1640 through 1730) for the bar graph.

Several screen dump programs for a variety of printers are available from past issues of THE RAINBOW, including one in the May 1985 issue that provides a full-page dump for the Gemini and Epson, but is painfully *slow*. The one included in *Tax Info* is no speed demon and produces a smaller graph, but it is several times faster. If you do not have an Epson-compatible printer, another alternative is to delete the screen dump routine altogether and simply replace it with a `RETURN` statement.

### Getting Set Up

First, load `TAXINFO.XX` and edit Line 240 to read `240 NA$="???"` where *???* is your name. Then save the program using `88` in place of `XX`. In other words, if you are planning to enter records for the year 1988, use the last two digits as the extension (i.e., `TAXINFO.88`). If you are entering records from 1987, use `87` as the extension. You should make a backup copy and keep a version of `TAXINFO.XX` as is, however, so you can repeat the process the following year when the new tax period begins.



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Next, run SETUP. This program does not use the inverse video procedure since you will be accessing disk files often. After running SETUP a menu appears that provides you with the following options:

1 — Number codes
2 — Names
3 — Places
4 — Accounts
5 — Taxinfo

First, select Option 1, "Number codes," by pressing 1 and then ENTER. Number codes are used when making entries for which there is no check number. Another menu appears:

1 — Enter new info
2 — List entries
3 — Modify

To get set up, select Option 1, "Enter new info." You will be asked for a code (respond with a number — a check number, for example). After you enter one, you will be asked for the full entry, "new entry." For example, I use the following entry codes: 000 for deposits, 001 for cash payment, 002 for travel, etc. When prompted for "new entry" I would enter "deposits," "cash payment" and "travel," etc.

Let me explain. When entering data in *Tax Info*, the first thing asked for is a number. I use the code number 000 to indicate that the entry refers to a deposit that I made to my account from earnings I received from my private practice or other sources (such as income received for this article). You should also use 000 to indicate deposits since it is the only number code that will also give you a total. This is helpful in getting a total for all deposits regardless of account category.

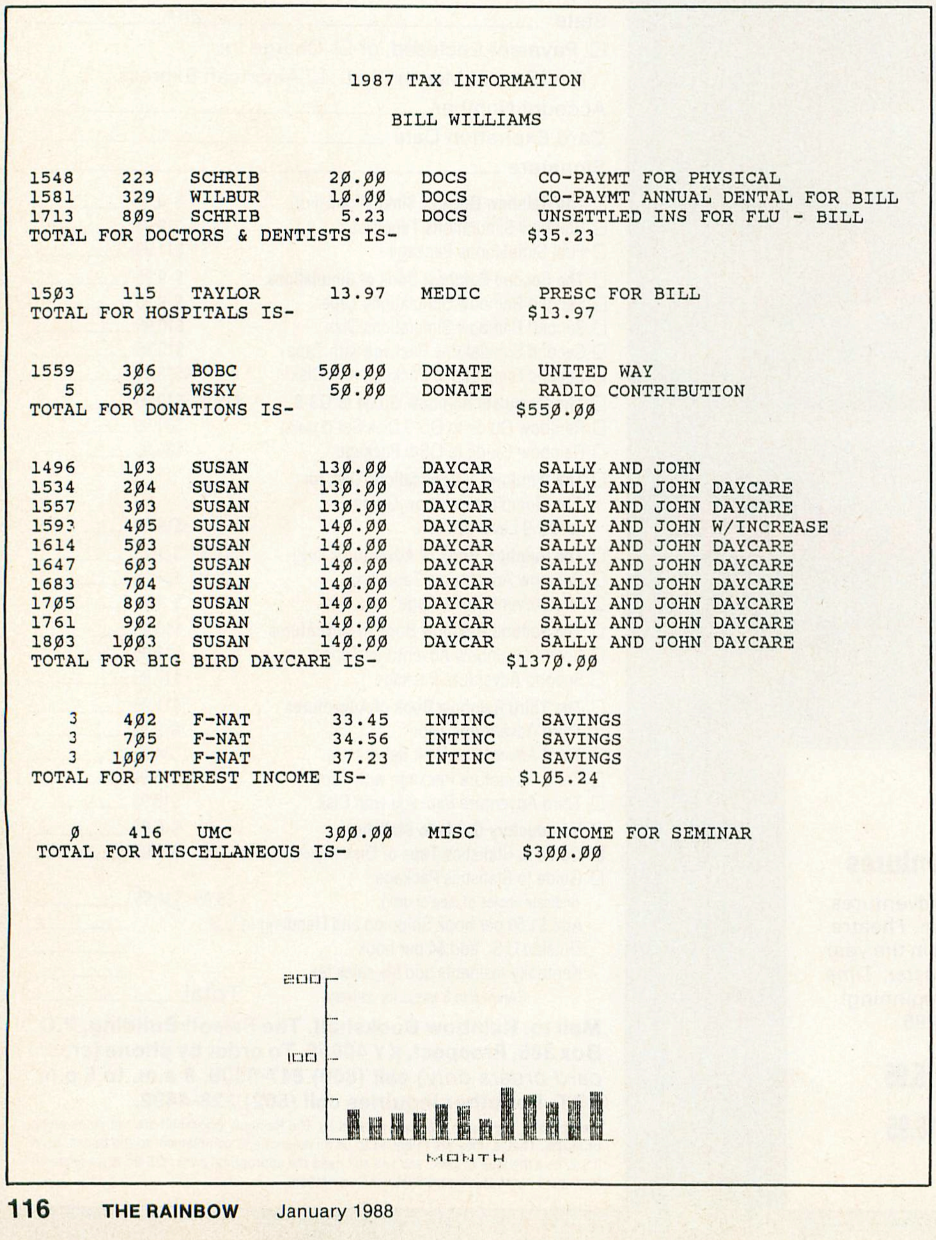
The code 001 tells me that I paid cash for something that is tax-deductible and that I should look for evidence of this transaction among my cash receipts instead of searching for a cancelled check. The code 002 tells me that the following information pertains to travel (I'll explain more about this later). The code 003 tells me that the following information is for reporting interest income. The code 004 is for interest expense. The code 005 tells me that I paid for something with a charge card and there is no check number or cancelled check for that entry.

You should decide on your own number codes to use. The codes simply provide information on any entry for which you do not have a cancelled check. Note: The only requirement other than using 000 for deposits to your account is that the code number -1 be reserved to exit from the data entry routine. The code -1 tells the computer that no more entries are to follow.

After each code and the full entry are entered, the prompt "Again" will appear. You must respond by pressing either Y or N and then ENTER. If you press Y you can enter additional number codes. If you press N, your codes will be stored in a file called NUMBER.DAT and you will be returned to SETUP's main menu.

After returning to SETUP's main menu, select Option 2, "Names." At the next menu, press 1 to enter new information. Then you are prompted to enter a six-digit maximum code for any person, store, company or whatever. For example, if you write a check to John Smith, you may want to code it as JOHNS or something similar. The reason for the codes is that *Tax Info* uses CoCo's standard 32-by-16 display, and there is only so much that can be shown on one line. *Tax Info* stores these codes and the full entry in a file called NAMES.DAT that will probably become quite lengthy after a couple of years' use.

Option 3 in SETUP's menu, "Places," is for creating code names for cities or places you visited that involve tax-deductible travel expenses. Your codes will be stored in a file called PLACES.DAT. Option 4, "Accounts," is for creating codes for various accounts. Some of the codes I use are UTIL for utilities, BUSINC for business income, INTINC for interest income, etc. If you plan to deduct travel expenses, you *must* use BUS.PROF TRAVEL as the full entry for your travel code. Type it in exactly as I have indicated here. You can store a maximum of 40 such codes.



```
                         1987 TAX INFORMATION

                            BILL WILLIAMS

1548     223    SCHRIB         20.00    DOCS       CO-PAYMT FOR PHYSICAL
1581     329    WILBUR         10.00    DOCS       CO-PAYMT ANNUAL DENTAL FOR BILL
1713     809    SCHRIB          5.23    DOCS       UNSETTLED INS FOR FLU - BILL
TOTAL FOR DOCTORS & DENTISTS IS-                 $35.23

1503     115    TAYLOR         13.97    MEDIC      PRESC FOR BILL
TOTAL FOR HOSPITALS IS-                          $13.97

1559     306    BOBC          500.00    DONATE     UNITED WAY
   5     502    WSKY           50.00    DONATE     RADIO CONTRIBUTION
TOTAL FOR DONATIONS IS-                         $550.00

1496     103    SUSAN         130.00    DAYCAR     SALLY AND JOHN
1534     204    SUSAN         130.00    DAYCAR     SALLY AND JOHN DAYCARE
1557     303    SUSAN         130.00    DAYCAR     SALLY AND JOHN DAYCARE
1593     405    SUSAN         140.00    DAYCAR     SALLY AND JOHN W/INCREASE
1614     503    SUSAN         140.00    DAYCAR     SALLY AND JOHN DAYCARE
1647     603    SUSAN         140.00    DAYCAR     SALLY AND JOHN DAYCARE
1683     704    SUSAN         140.00    DAYCAR     SALLY AND JOHN DAYCARE
1705     803    SUSAN         140.00    DAYCAR     SALLY AND JOHN DAYCARE
1761     902    SUSAN         140.00    DAYCAR     SALLY AND JOHN DAYCARE
1803    1003    SUSAN         140.00    DAYCAR     SALLY AND JOHN DAYCARE
TOTAL FOR BIG BIRD DAYCARE IS-                 $1370.00

   3     402    F-NAT          33.45    INTINC     SAVINGS
   3     705    F-NAT          34.56    INTINC     SAVINGS
   3    1007    F-NAT          37.23    INTINC     SAVINGS
TOTAL FOR INTEREST INCOME IS-                   $105.24

   0     416    UMC           300.00    MISC       INCOME FOR SEMINAR
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These codes will be stored in a file called `ACCOUNTS.DAT`. Option 5, "Taxinfo," allows you to go straight from the `SETUP` menu to `TAXINFO`.

Should you need to modify any of your codes, select the appropriate option from `SETUP`'s main menu (e.g., "Accounts," if an account code is to be changed), and then select Option 2, "List entries," from `SETUP`'s second menu. Each entry you made previously was assigned a record number, and you need to list the entries to determine which record number you will need; these record numbers will be displayed with the listing. Press ENTER to scroll through the list. You will be returned to `SETUP`'s first menu when you have reached the end of the scroll and press ENTER again. Select the "Accounts" option again. Then select Option 3, "Modify," from `SETUP`'s second menu in order to change the record. Enter the record number you want. You will be told to enter the new code and the full entry, and the change will be made and stored on disk.

**Running TAXINFO**

With your disk in Drive 0, simply type `RUN "TAX"` and press ENTER. You will see a title screen displayed, which will disappear in a couple of seconds. You will then be asked to enter the year you want. Remember to enter the last two digits only (e.g., `87`). As you will recall, you made some changes in `TAXINFO.XX` and saved it as `TAXINFO.88` (or `87`, depending on the year you are working on). You will then be asked to wait while the program reads in your codes from the account category you just created using `SETUP` (if you did not run `SETUP` first and create at least one account code, you will get an IE Error).

Also, since `SETUP` stores all information as a direct access file, unnecessary spaces at the end of each string will be eliminated when *Tax Info* reads them in; this will make your later printouts look much nicer. After a few seconds, the main menu appears. Here are your options:

1 — Add
2 — Codes
3 — Number
4 — Date
5 — Name
6 — Account
7 — Bar Graph
8 — Search
9 — Load
10 — Setup

If you select Option 1, "Add," you will again be asked to wait, because BASIC will be moving the variable table into high memory to make room for `DATA` statements. It will also find the last line of the program, which is `DATA-1` (the number -1 indicates the last data entry), and blank it out. The screen will then clear, and you will see at the top of the screen the statement "Space=212" indicating how many entries you will be able to make. If you need to make more than 212 entries, change the `PCLEAR 4` to `PCLEAR 1` in Line 20. Everything should work as usual except that you will get an OM Error if you try to select the Bar Graph option — that's the tradeoff for more memory. However, it will allow you to make 285 entries instead of only 212. I have not found a need for more than 212 entries per year, but someone with a more complicated situation might appreciate the extra memory.

You will also be asked to indicate the number for the entry. As mentioned earlier, this will usually be a check number, but it could be one of your code numbers. Next you will be asked for the date, which must be given as a four-digit number, such as 0106 for January 6, or 1017 for October 17, and so forth. Then you will be asked to enter a name. You should enter the code name for the person you paid (or who paid you, as the case may be). You will next be asked to indicate the amount (e.g., 65.34 for $65.34) and then the account. Remember to enter your code for the account (e.g., `DOCS` for doctors and

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dentists). Next, you will be asked for a comment. This can be anything you like; I usually enter some explanation of what the entry was for. The comment should not exceed 32 characters. Lastly, you will be asked whether you want to make changes. If you select Y you will be given the opportunity to start over on that entry.

If you forget what your code is while you are entering numbers, names, places, or accounts, just enter the word `CODES`. You will be presented with a Codes menu that asks you which code you want. If you select "Names," your codes and the full entries will appear on the screen. At the bottom of the screen, you will be asked to make your selection now that your memory has been refreshed. You can do the same thing for number codes, accounts and places.

After you have made all your entries, simply type `-1` when you are asked to input a number and the last `DATA` line will once again be `DATA-1`. You will be prompted to enter a two-digit number for year, and your changes will be saved to disk. You then will be returned to the main menu.

If you select Option 2, "Codes," from the main menu, you will be presented with the Codes menu as mentioned above. It can be accessed either from the main menu or from within the Add routine.

Selecting Option 3, "Number," from the main menu allows you to search for a specific check by number. It is the only way to list your comments for the entry, other than getting a hard copy on the printer. If you select one of your number codes instead of a check number, all entries with similar numbers will be listed. If you used 000, as I suggested earlier, to indicate deposits into your account, you will also get a total.

Selecting Option 4, "Date," will allow you to list all entries within a time period. It will ask you for a beginning date and an ending date, and all entries with dates between the two will be listed. Remember that the format for entering dates is a four-digit number indicating month and day (e.g., 0721 for July 21).

Option 5, "Name," allows you to list all entries by name. If you want to see how much you paid your physician, Dr. Kuttum, simply enter your code for his name exactly. You will be asked whether money was received from or paid to him. After that, all entries and the total will be listed.

Option 6, "Account," lets you get a listing of all entries by type of account and gives you a total. It also lets you print the results to your printer or to the screen. When the program asks for the account, enter your code for the account you want. You may also enter `ALL`, and all of your entries for the year will be printed, either to the screen or to the printer, for each account. This is the routine you would use at tax time when you need all of your information to forward to your tax accountant.

Incidentally, the printer routine assumes you will be printing at 600 baud. If you want to print at a faster rate, simply type `POKE 150,x`, where *x* is 7 for 4800 baud or 1 for 9600 baud, *before* you run the program. And your serial-to-parallel interface, if you have one, should be set accordingly. If you have the results printed to the screen instead of to the printer, each entry will be listed for the first account, a total will be given, and after a couple of seconds the screen will clear for the next account, and so on.

The "Bar Graph" option, Option 7, allows you to see graphically any payment that is made *monthly*. For example, if you want to see a plot of your monthly electricity bill, enter the code name for your electrical company. The program will not produce a graph of entries by account, only by name. If you enter the name of a company or person that you pay on pay periods other than a monthly basis, the label on the X axis, "month," will be inappropriate. Since the graph is intended only for bills paid

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monthly, it will plot only 12 entries *without going* completely off the graph. Also, entries greater than $300 will result in an "Entry Too Large" message.

To proceed, press ENTER. You will be asked if you want a screen dump of the graph. If so, simply press Y. If the printer is not turned on, you will be prompted to turn it on.

Option 8, "Search," enables you to find the line numbers where certain strings are located. You can use BASIC's editing commands to make changes or correct errors. Note, however, that the Search routine assumes that `DATA` lines begin in Line 10001. If you renumber the program, it will not work properly.

Option 9, "Load," allows you to reexamine data from previous years. Since I have been using the program for three years, I sometimes enter `84` or `85` to review the data from those years for comparison.

The last option, Option 10, "Setup," allows you to go directly to the `SETUP` program. This is useful if you have just entered new data and created new codes. You probably will want to store the new data and codes using `SETUP` so you can recall them at a later date.

**Travel**

If you deduct travel expenses, *Tax Info* will let you record your trips. After selecting "Add" from the main menu, you will be asked to enter a number. Simply enter your code number for travel. Then, when asked for the name, enter the code for the place you visited. When asked for the amount, enter miles driven. When asked for the account, use your code for travel. Remember, in setting things up, you must use `BUS/PROF TRAVEL` as the full entry for your travel code. Type it in exactly as I have it. Do not use periods or change the way in which it is presented here.

When I enter comments, I try to squeeze in odometer readings from before and after the trip as well as a very brief explanation of what the trip was for. Remember that the comments should not exceed 32 characters in length.

**Starting a New Year**

When you want to start over with a new year, simply run the `TAX.BAS` program. Enter `XX` for the year. Then, after you have entered data, save it (Option 8) with the appropriate two-digit number for the year. Another way of starting a new year is to edit `TAX-INFO.87` (or `86`) directly. Delete all entries from Line 10001 on (unless you renumber the program, all entries start at this line). If you edit the program directly, make absolutely certain that you enter a new Line 10001 that has `DATA-1`. This must always be the very last line of the program. The second method of starting a new year would be useful if you somehow deleted `TAX-INFO.XX` from the disk.

If you have 40 or nearly 40 accounts, it is possible you may get an OM Error. To avoid this possibility, try to make your accounts (the full names) as short as possible.

If you press BREAK while running *Tax Info* and then start the program over, you will get some strange results when printing out all the information. More specifically, the printout will say `19DA TAX INFORMATION` instead of using the proper two-digit number for year. This is because the program gets the year by peeking two locations to get the first two characters of the extension of the last file loaded (see Line 30). By breaking and reentering, the last file loaded will be the `ACCOUNTS.DAT` file, and the first two characters of the extension will be `DA` instead of the year.

If you break from the program, you will see only `IN 240` (or whatever line number was involved) instead of the usual message `BREAK IN 240`. `REV-FIELD` is responsible for this, and otherwise does no harm.

If you list the directory, you will notice that *Tax Info* takes up nine granules of space whether entries have been made or not. The reason is that the program moves the variable table into high memory the first time it is run, making room for your `DATA` statements. Entries are simply made into the space that has already been created.

**Things to Remember**

At the risk of sounding repetitious, there are several things you need to remember:

1. Use 000 as your code number for deposits.
2. Use -1 as your code number to exit from "Add."
3. Use `BUS/PROF TRAVEL` as your full entry for your travel code.
4. While making entries in the "Add" routine, type the word `CODES` if you need to review your codes for number, name, place or account.
5. While in the "Accounts" routine, if you are asked what account you want, you may enter `ALL` to get a listing of all entries by account category.
6. Save your entries immediately after exiting the "Add" routine to make sure you do not forget.
7. The "Load" and "Setup" options in the *Tax Info* main menu are destructive and will wipe out your

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entries if you have not saved them.

8. You must have at least one entry in `ACCOUNTS.DAT` before running `TAX.BAS` or you will get an IE Error.
9. If the program bombs, you may type `GOTO 270` to return to the main menu without losing any entered data that has not yet been saved.

*(Questions or comments regarding this program may be directed to the author at 223 S. Edna St., Stillwater, OK 74075. Please enclose an SASE when requesting a reply.)* □

*Editor's Note: The program* `REVFIELD.BIN`*, from August 1983, will be included on this month's RAINBOW ON TAPE and RAINBOW ON DISK. To transfer the file from tape to disk, first enter* `CLEAR 200,32543`*, then enter* `CLOADM"REVFIELD"`*. Then type* `SAVEM"REVFIELD.BIN",&H7F20,&H7FDF,&H7F20`.

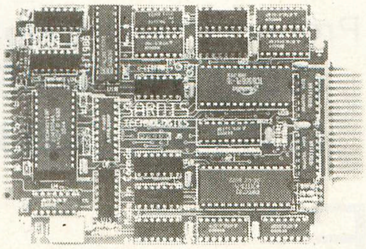
**Listing 1:** `TAX.BAS`

```
10 CLS
20 FOR X=1 TO 68
30 READ Y:POKE 1024+Y,128
40 NEXT X
50 FOR X=1TO7:READ Y:POKE1024+Y,
139:NEXT
60 FOR X=1TO7:READY:POKE1024+Y,1
41:NEXT:POKE1132,142:POKE1225,14
2:POKE1165,135:POKE1258,135
70 PRINT@332,"(C) 1985";:PRINT@3
90,"ROBERT S. SCHLOTTMANN";:PRIN
T@424,"223 S. EDNA ST.";:PRINT@4
54,"STILLWATER, OK 74075";
80 FOR I=1 TO 800:NEXTI
100 CLEAR 200,32543
110 LOADM"REVFIELD/BIN":EXEC
120 PRINT@266,"ENTER YEAR":PRINT
@295,"(LAST 2 DIGITS)"
130 INPUT A$
140 B$="TAXINFO"+CHR$(47)+A$
150 LOAD B$,R
160 DATA97,98,99,101,102,103,105
,124,125,126
,109,111,113,117,119,120,121,123
170 DATA130,133,135,138,140,143,
145,146,149,151,155,158,162,165,
166,167,171,175,177,179,181,183,
184,187,190
180 DATA194,197,199,202,204,207,
209,212,213,215,219,222,226,229,
231,233,237,239,241,245,247,251,
252,253,254
190 DATA137,170,178,203,211,236,
244
200 DATA106,114,139,147,172,180,
205
```

| | | | |
|---|---|---|---|
| 140 | 223 | 1390 | 147 |
| 350 | 126 | 1560 | 62 |
| 570 | 104 | 1800 | 176 |
| 840 | 79 | 2040 | 29 |
| 1020 | 74 | 2375 | 136 |
| 1190 | 216 | END | 28 |

**Listing 2:** `TAXINFO.XX`

```
10 POKE 27,118:POKE 28,00
20 EXEC:CLEAR 1000:PCLEAR4:DIMC$
(80)
30 EX$=CHR$(PEEK(2388))+CHR$(PEE
K(2389))
40 OPEN"D",#1,"ACCOUNTS/DAT",32:
RN=0
50 FIELD#1,10 AS A$, 22 AS B$
```



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The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send $25 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged $3.50 each month for direct billing.

## PEEK INTO THE RAINBOW

The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

## THE OTHER SIDE OF THE RAINBOW

**On Delphi, you also are able to buy RAINBOW ON TAPE** — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

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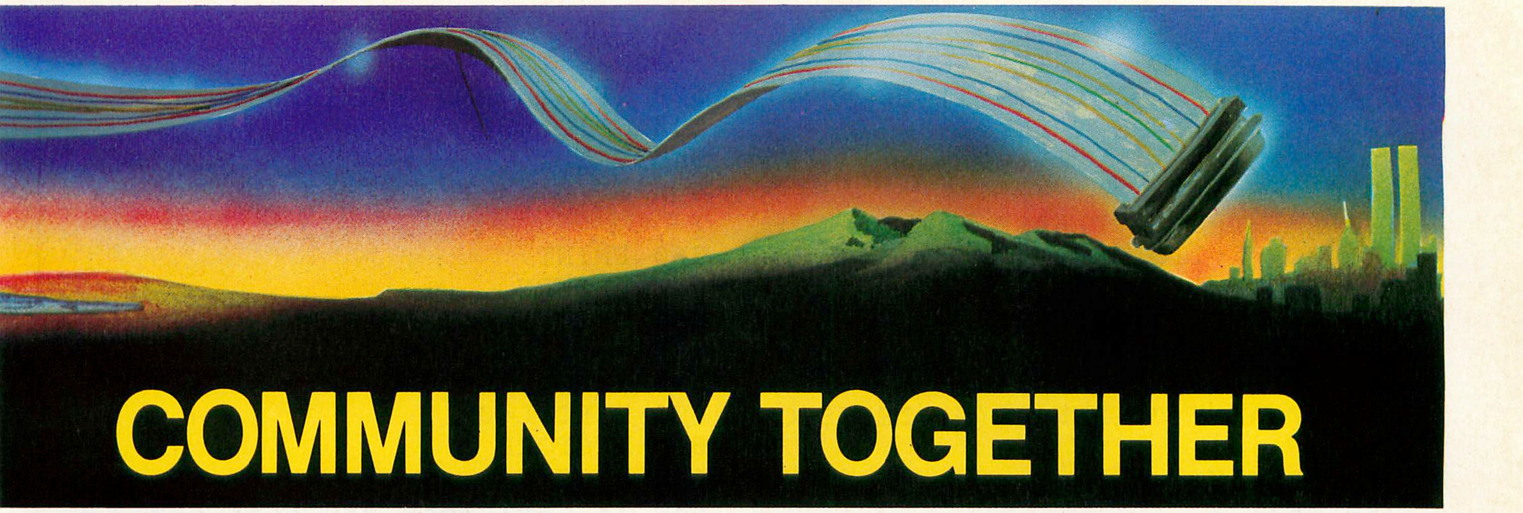

# COMMUNITY TOGETHER

## How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Telenet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Telenet or Tymnet. Canadian residents using Datapac will be charged an additional $10.80 (U.S.) per hour.

**On Telenet:** Uninet network has merged with Telenet. To get the Telenet number for your area, call (800) 336-0437. After you call the local access number and make connection, press ENTER twice. When the "TERMINAL=" prompt appears, press ENTER again. When the "@" prompt appears, type `C DELPHI` and press ENTER.

**On Tymnet:** Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type `DELPHI` and press ENTER.

**From Canada (on Datapac):** Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type `SET 2:1, 3:126` and press ENTER. Now type `p 1 3106, DELPHI;` and press ENTER. Delphi's new rates indicate an additional $10.80 hourly surcharge for evening use of Datapac, which means a total of $18 (U.S.) for connect time.

**From other countries:** Many countries have their own data networks that can connect to either Telenet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 3110 6170 3088 through Telenet, or 3106 90 6015 through Tymnet. (You'll have to pay the toll charges for this connection.)

**Type in Your Username**

If you're already a subscriber to THE RAINBOW, at the "USERNAME:" prompt, type `JOINDELPHI` and press ENTER. At the "PASSWORD:" prompt, type `RAINBOW`. Then, at the "NUMBER:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

**If you don't already have a subscription**, at the "USERNAME:" prompt, type `JOINDELPHI` and press ENTER. At the "PASSWORD:" prompt, type `SENDRAINBOW` and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just use Control-X and start over. Remember that at any point, when you're on Delphi, you can type `HELP` to get help on how to use the system. To get off the system just type `BYE`.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

**Come Visit Us! Type:** `GROUP COCO`

After you sign in, you'll be prompted to set up your own, personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next day. Once an account is verified and opened, *each RAINBOW subscriber will be credited with an hour of free time!*

When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in `GROUP COCO` and **join us on the CoCo SIG!**

```
60 FOR X=1 TO 80 STEP2:RN=RN+1:G
ET#1,RN:C$(X)=A$:C$(X+1)=B$
70 IF LOF(1)=RN THEN 90
80 NEXTX
90 CLOSE#1
100 PRINT@266,"PLEASE WAIT";
110 FOR X=1TO RN*2
120 FOR Y=1 TO 22
130 A$=RIGHT$(C$(X),1)
140 F=LEN(C$(X))-1
150 IF A$<>" " THEN 180
160 IF A$=" " THEN C$(X)=LEFT$(C
$(X),F)
170 NEXT Y
180 NEXT X
200 UL$=CHR$(27)+CHR$(45)+CHR$(1
)
210 NU$=CHR$(27)+CHR$(45)+CHR$(0
)
220 EE$=CHR$(14)
230 TA$="19"+EX$+" TAX INFORMATI
ON"
240 NA$="PUT YOUR NAME HERE ON L
INE 240"
250 GOTO 270
260 INPUT "IF YOU WANT TO CONTIN
UE, PRESS                <ENTER>";
K
270 POKE32544+54,0:EXEC
280 PRINT@9,"*** MENU ***"
290 PRINT@64,"1-ADD"
300 PRINT@128,"2-CODES"
310 PRINT@192,"3-NUMBER"
320 PRINT@256,"4-DATE"
330 PRINT@320,"5-NAME"
340 PRINT@85,"6-ACCOUNT"
350 PRINT@149,"7-BAR GRAPH"
360 PRINT@213,"8-SEARCH"
370 PRINT@277,"9-LOAD"
380 PRINT@340,"10-SETUP"
390 PRINT@421,"SELECTION (1-8)";
:INPUT N
400 ON N GOSUB 2030,1800,420,580
,700,870,1270,2460,2400,2440
410 GOTO 260
420 EXEC:INPUT "ENTER NUMBER";G
430 T=0:L=0
440 RESTORE
450 READ C
460 IF C=-1 THEN 540 ELSE 470
470 READ D,P$,A,T$,CM$
480 IF L>=448 THEN A$=INKEY$:IF
A$="" THEN 480
490 IF L>=448 THEN EXEC:L=0
500 IF G=C THEN GOSUB 1780:PRINT
CM$:L=L+32
510 IF G<=5 AND G=C THEN T=T+A:L
=L+32
520 IF G>5 AND G=C THEN L=L+32
530 GOTO 450
540 PRINT
550 IF G<=5 THEN PRINT "TOTAL=";
T
560 PRINT
570 RETURN
580 EXEC:INPUT "BEGINNING DATE";
W
590 INPUT "ENDING DATE";Y
600 EXEC:L=0
610 RESTORE
620 READ C
630 IF C=-1 THEN 690 ELSE 640
640 READ D,P$,A,T$,CM$
650 IF L>=448 THEN A$=INKEY$:IF
A$="" THEN 650
660 IF L>=448 THEN EXEC:L=0
670 IF W<=D AND Y>=D THEN GOSUB
1780:L=L+32
680 GOTO 620
690 RETURN
700 EXEC:INPUT"GIVE THE NAME OF
THE PARTY PAID OR THE NAME OF TH
E PARTY FROM   WHOM MONEY WAS RE
CEIVED";R$
710 PRINT
720 INPUT "WAS MONEY RECEIVED FR
OM (1) OR  PAID TO (2) THIS PART
Y";U
730 ON U GOTO 740,1180
740 EXEC:T=0:L=0
750 RESTORE
760 READ C
770 IF C=-1 THEN 830 ELSE 780
780 READ D,P$,A,T$,CM$
790 IF L>=448 THEN A$=INKEY$:IFA
$="" THEN 790
800 IF L>=448 THEN EXEC:L=0
810 IF C=0 AND R$=P$ THEN GOSUB
1780:T=T+A:L=L+32
820 GOTO 760
830 IF U=1 THEN PRINT "TOTAL REC
EIVED FROM "R$" IS-":PRINTUSING"
$$####.##";T
840 IF U=2 THEN PRINT "TOTAL PAI
D TO "R$" IS-":PRINTUSING"$$####
.##";T
850 PRINT
860 RETURN
870 EXEC:INPUT "WHAT ACCT. DO YO
U WANT";M$
880 INPUT "OUTPUT TO PRINTER (Y/
N)";YN$:IFYN$="Y" THEN POKE32544
+54,255:ELSE IF YN$="N" THEN 920
890 PO=PEEK(65314):IF PO/2<>INT(
PO/2) THEN 900 ELSE 915
900 EXEC:PRINT@265,"TURN ON PRIN
TER";
910 A$=INKEY$:IF A$="" THEN 910
915 L2=LEN(NA$):L1=((80-(2*L2))/
2)
920 IF YN$="Y"AND M$="ALL" THEN
PRINT#-2,TAB(20)EE$;TA$:PRINT#-2
:PRINT#-2,TAB(L1)EE$;NA$:PRINT#-
2:PRINT#-2
930 IF M$="ALL" THEN 940 ELSE 95
0
940 FOR I=1 TO 80 STEP 2:M$=C$(I
):GOSUB 950:NEXTI
950 IF M$="" THEN 1170
960 EXEC:T=0:L=0
970 RESTORE
980 READ C
990 IF C=-1 THEN 1060 ELSE 1000
1000 READ D,P$,A,T$,CM$
1010 IF L>=448 AND YN$<>"Y"THEN
A$=INKEY$:IFA$="" THEN 1010
1020 IF L>=448 THEN EXEC:L=0
1030 IF T$=M$ THEN GOSUB 1780:L=
L+32:T=T+A
1040 IFT$=M$ AND YN$="Y" GOSUB 1
750
1050 GOTO 980
1060 FOR X=1 TO 80
1070 IF M$=C$(X) THEN M$=C$(X+1)
:GOTO 1090
1080 NEXT
1090 PRINT
1100 IF M$<>"BUS/PROF TRAVEL" TH
EN PRINT "TOTAL-"M$:PRINT USING
"$$#####.##";T
1110 IF M$="BUS/PROF TRAVEL" THE
N PRINT "TOTAL BUSINESS/PROFESSI
ONAL           MILEAGE IS-";T
1120 IF M$="BUS/PROF TRAVEL" AND
 YN$="Y" THEN PRINT#-2,"TOTAL ";
UL$;"BUSINESS/PROFESSIONAL MILEA
GE";NU$;" IS-";TAB(53)T;"MILES"
1130 IF M$<>"BUS/PROF TRAVEL" AN
D YN$="Y" THEN PRINT#-2,"TOTAL F
OR ";UL$;M$;NU$;" IS-";TAB(45):P
RINT#-2,USING "$$#####.##";T
1140 IF YN$="Y" THEN PRINT#-2:PR
INT#-2:GOTO 1170
1150 FOR K=1 TO 400:NEXTK
1160 PRINT:POKE32544+54,0
1170 RETURN
1180 EXEC:T=0:L=0
1190 RESTORE
```

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```
1200 READ C
1210 IF C=-1 THEN 840 ELSE 1220
1220 READ D,P$,A,T$,CM$
1230 IF L>=448 THEN A$=INKEY$:IF
A$="" THEN1230
1240 IF L>=448 THEN EXEC:L=0
1250 IF C>0 AND R$=P$ THEN GOSUB
 1780:T=T+A:L=L+32
1260 GOTO 1200
1270 EXEC:INPUT "NAME";Z$
1280 PMODE4:PCLS:SCREEN1,1
1290 DRAW "BM50,50 NR5D25NR5D25N
R5D25NR5D25NR5D25R130
1300 DRAW "BM30,48 R4D2L4D2R4BU4
BR2R4D4L4U4BR6R4D4L4U4"
1310 DRAW "BM32,102 U4BR2R4D4L4U
4BR6R4D4L4U4"
1320 DRAW "BM93,165 U4F3E3D4BU4B
R3R4D4L4U4BR7ND4F4U4BR3R4BL2D4BU
4BR5D4BR4U4BD2L4"
1330 L=60
1340 RESTORE
1350 READ C
1360 IF C=-1 THEN 1430
1370 READ D,P$,A,T$,CM$
1380 IF P$=Z$ AND A>300 THEN PRI
NT@200,"ENTRY TOO LARGE":V$=INKE
Y$:IF V$="" THEN 1380 ELSE 1460
1390 IF P$=Z$ THEN 1400 ELSE 142
0
1400 LINE (L,150)-(L+5,150-A/2),
PSET,BF
1410 L=L+10
1420 GOTO 1350
1430 A$=INKEY$:IF A$=""THENGOTO1
430
1440 INPUT "DO YOU WANT A SCREEN
 DUMP";QY$
1450 IF QY$="Y" THEN POKE32544+5
4,255:GOTO1470 ELSE 1460
1460 EXEC:RETURN
1470 PO=PEEK(65314):IF PO/2<>INT
(PO/2) THEN EXEC:PRINT@265,"TURN
 ON PRINTER";:ELSE 1490
1480 A$=INKEY$:IFA$="" THEN 1480
1490 EXEC:PRINT@267,"PRINTING";
1500 PMODE4:PCLS:SCREEN0,0
1510 DRAW "BM67,155 NU5R25NU5R25
NU5R25NU5R25U130
1520 DRAW "BM65,174 U4R2D4R2U4BL
4BU2U4R4D4L4BU6U4R4D4L4"
1530 DRAW "BM118,172 L4BU2U4R4D4
L4BU6U4R4D4L4"
1540 DRAW "BM200,122 L4E3H3R4BL4
BU3U4R4D4L4BU7NR4E4L4BU3U4BD2R4B
L4BU5R4BU4L4BR2D4"
1550 L=145
1560 RESTORE
```

```
1570 READ C
1580 IF C=-1 THEN 1640
1590 READ D,P$,A,T$,CM$
1600 IF P$=Z$ THEN 1610 ELSE 163
0
1610 LINE (167,L)-(167-A/2,L-5),
PSET,BF
1620 L=L-10
1630 GOTO 1570
1640 X=0:Y=0:PRINT#-2,TAB(10)Z$
1650 PRINT#-2,CHR$(27)+"1"
1660 FOR X=3558 TO 3558+21
1670 PRINT#-2,CHR$(27)+"K"+CHR$(
191)+CHR$(0);
1680 FOR Y=X+(191*32) TO X STEP-
32
1690 PRINT#-2,CHR$(PEEK(Y));
1700 NEXT Y
1710 PRINT#-2
1720 NEXT X
1730 PRINT#-2,CHR$(27)+"2"
1740 POKE32544+54,0:EXEC:RETURN
1750 'PRINT ROUTINE
1760 PRINT#-2,USING"####    ####
   %    %   #####.##   %    %
%
%";C,D,P$,A,T$,CM$
1770 RETURN
1780 PRINTUSING"#### #### %    %
 ####.## %    %";C,D,P$,A,T$
1790 RETURN
1800 EXEC:PRINT@42,"CODES INFO"
1810 PRINT@96,"1-NUMBER CODES"
1820 PRINT@160,"2-PLACES"
1830 PRINT@224,"3-NAMES"
1840 PRINT@288,"4-CATEGORY CODES
"
1850 INPUT CN
1860 IF CN=1 THEN NM$="NUMBER":G
OSUB 1910
1870 IF CN=2 THEN NM$="PLACES":G
OSUB 1910
1880 IF CN=3 THEN NM$="NAMES":GO
SUB 1910
1890 IF CN=4 THEN NM$="ACCOUNTS"
:GOSUB 1910
1900 RETURN
1910 EXEC
1920 OPEN"D",#1,NM$,32:RN=0:L=0
1930 FIELD #1,10 AS A$, 22 AS B$
1940 RN=RN+1
1950 GET#1,RN
1960 PRINT@L,A$;B$
1970 L=L+32
1980 IF INT(L/448)=L/448 THEN V$
=INKEY$:IF V$="" THEN 1980
1990 IF L>=448 THEN EXEC:L=0
2000 IF LOF(1)<>RN THEN1940
```

```
2010 CLOSE#1
2020 RETURN
2030 EXEC:PRINT@233,"PLEASE WAIT
":A$=""
2040 AA=PEEK(25)*256+PEEK(26)
2050 BB=PEEK(AA)*256+PEEK(AA+1)
2060 CC=PEEK(AA+2)*256+PEEK(AA+3
)
2070 IF BB=0 THEN 2090
2080 A1=AA:AA=BB:C1=CC:GOTO 2050
2090 FOR I=A1 TO A1+3:POKE I,0:N
EXT
2100 LL=A1+3
2110 VT=PEEK(27)*256+PEEK(28)
2120 SP=INT((VT-LL)/64)
2130 EXEC:PRINT TAB(10)"space=";
SP
2140 IF A$="-1" THEN 2370
2150 PRINT" ***INPUT -1 FOR LAST
 ENTRY***"
2160 INPUT "NUMBER";A1$
2170 IF A1$="-1" THEN Z=0:GOTO 2
290
2180 IF A1$="CODES" GOSUB 1800:G
OTO2160
2190 INPUT "DATE";A2$
2200 INPUT "NAME/PLACE";A3$
2210 IFA3$="CODES"GOSUB1800:GOTO
2200
2220 INPUT "AMT./MILES";A4$
2230 INPUT "ACCT.";A5$
2240 IFA5$="CODES"GOSUB1800:GOTO
2230
2250 INPUT "COMMENT";A6$
2260 INPUT"DO YOU WANT TO MAKE C
ORRECTIONS BEFORE CONTINUING? (Y
/N)";B$:IF B$="Y" THEN 2160
2270 A$=A1$+","+A2$+","+A3$+","+
A4$+","+A5$+","+A6$
2280 GOTO2300
2290 A$=A1$
2300 AA=A1+4:FOR I=1 TO 64:POKE
AA,32:AA=AA+1:NEXT
2310 AA=A1+64:DD=INT(AA/256):D1=
AA-(DD*256):POKE A1,DD:POKE A1+1
,D1
2320 DD=INT(C1/256):D1=C1-(DD*25
6):POKE A1+2,DD:POKE A1+3,D1:POK
E A1+4,134:A1=A1+5
2330 FOR I=1 TO PEEK(VARPTR(A$))
:BB=PEEK(256*PEEK(VARPTR(A$)+2)+
PEEK(VARPTR(A$)+3)+I-1)
2340 POKE A1,BB:A1=A1+1:NEXTI
2350 FOR I=AA-1 TO AA+3:POKE I,0
```

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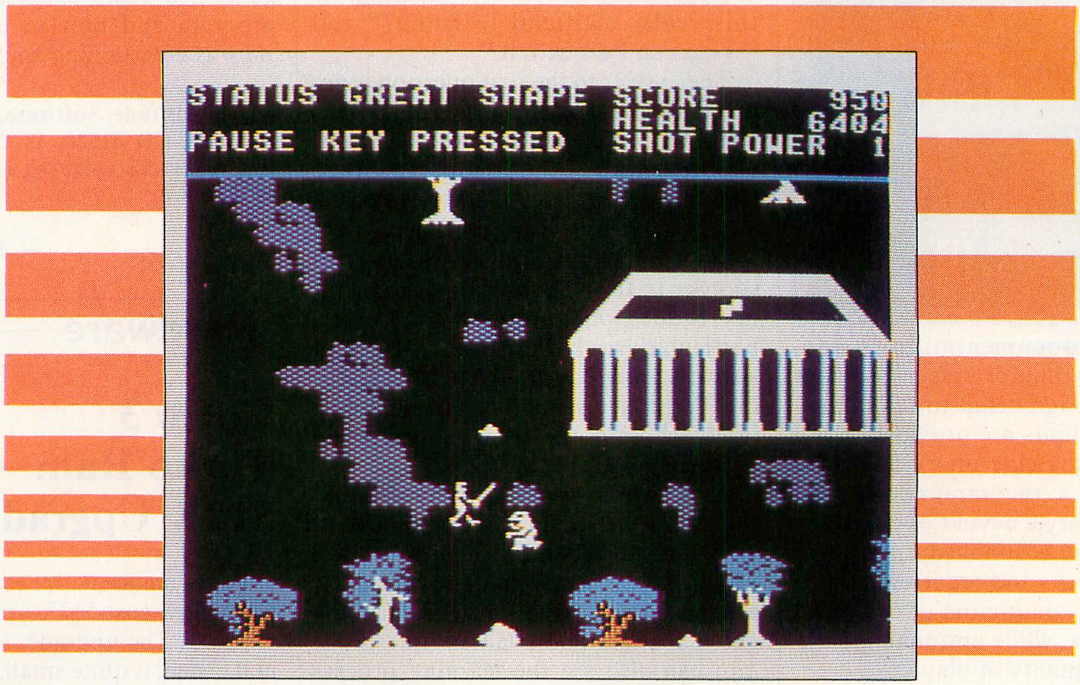
```
:NEXT
2360 A1=AA:C1=C1+1:SP=SP-1:GOTO
2130
2370 EXEC:PRINT@11,"S-A-V-E":PRI
NT:INPUT"ENTER YEAR (LAST 2 DIGI
TS)";F2$
2375 IF VAL(F2$)<80 OR VAL(F2$)>
99 THEN 2370
2380 F1$="TAXINFO"+CHR$(47)+F2$
2390 SAVE F1$:RETURN
2400 EXEC:INPUT"SURE";S$:IF S$<>
"Y" THEN RETURN
2410 EXEC:PRINT@11,"L-O-A-D":PRI
NT:INPUT"ENTER YEAR (LAST 2 DIGI
TS)";F2$
2420 F1$="TAXINFO"+CHR$(47)+F2$
2430 LOAD F1$,R
2440 EXEC:INPUT"SURE";S$:IF S$<>
"Y" THEN RETURN
2450 LOAD"SETUP",R
2460 EXEC:CT=0:SN$="":RESTORE:PR
INT@8,"S E A R C H":LINEINPUT"
   ENTER TARGET STRING
";SN$:LN=10001
2470 READ C
2480 IF C=-1 THEN PRINT"SEARCH O
VER"ELSE GOTO 2490
2485 ZZ$=INKEY$:IF ZZ$="" THEN 2
485
2487 RETURN
2490 READ D,P$,A,T$,CM$:IFVAL(SN
$)=D OR SN$=P$ OR VAL(SN$)=A OR
SN$=T$ OR SN$=MID$(CM$,1,LEN(SN$
)) THEN PRINT "LINE #";LN
3000 LN=LN+1:GOTO2470
10001 DATA -1
```

170 .......18
370 .......49
END .....230

Listing 3: SETUP.BAS

```
10 POKE 32544+54,255:CLS
20 PRINT@108,"CODES"
30 PRINT@168,"1-NUMBER CODES"
40 PRINT@232,"2-NAMES"
50 PRINT@296,"3-PLACES"
60 PRINT@360,"4-ACCOUNTS"
70 PRINT@424,"5-TAXINFO"
80 INPUT NM
90 IF NM=1 THEN NM$="NUMBER"
100 IF NM=2 THEN NM$="NAMES"
110 IF NM=3 THEN NM$="PLACES"
120 IF NM=4 THEN NM$="ACCOUNTS"
130 IF NM=5 THEN CLS:Y1=PEEK(157
)*256+PEEK(158):IF Y1=32544 THEN
140 ELSE 150 ELSE 160
140 PRINT@11,"L-O-A-D":PRINT:INP
UT "ENTER YEAR (LAST 2 DIGITS)";
F2$:F1$="TAXINFO"+CHR$(47)+F2$:L
OAD F1$,R
150 LOAD "TAX",R
160 IF NM<1 OR NM>5 THEN 80
170 CLS
180 PRINT@168,"1-ENTER NEW INFO
190 PRINT@232,"2-LIST ENTRIES
200 PRINT@296,"3-MODIFY
210 INPUT N
220 CLS:ON N GOTO 230,340,450
230 OPEN"D",#1,NM$,32
240 FIELD #1,10 AS AB$, 22 AS EN
$
250 RN=LOF(1)+1
260 INPUT "CODE FOR NEW ENTRY
          (6 CHAR MAX)";A$
270 INPUT "NEW ENTRY
          (22 CHAR MAX)";B$
280 LSET AB$=A$
290 LSET EN$=B$
300 PUT #1,RN
310 INPUT "AGAIN";YN$:IFYN$="Y"
THEN 250 ELSE 320
320 CLOSE#1
330 GOTO 10
340 OPEN"D",#1,NM$,32:RN=0
350 FIELD #1,10 AS A$, 22 AS B$
360 RN=RN+1
370 GET#1,RN
380 PRINT"RECORD NUMBER ";RN
390 PRINT A$;B$
400 IF INT(RN/5)=RN/5 THEN V$=IN
KEY$:IF V$="" THEN 400
410 IF LOF(1)<>RN THEN 360
420 CLOSE#1
430 V$=INKEY$:IF V$="" THEN 430
440 GOTO 10
450 OPEN"D",#1,NM$,32
460 FIELD #1, 10 AS AB$, 22 AS E
N$
470 INPUT "RECORD  #";RN
480 GET#1,RN
490 PRINT"RECORD NUMBER ";RN
500 PRINT AB$;EN$
510 INPUT "MODIFIED CODE
          (6 CHAR MAX)";A$
520 INPUT "MODIFIED ENTRY
          (22 CHAR MAX)";B$
530 LSET AB$=A$
540 LSET EN$=B$
550 PUT #1,RN
560 PRINT"AGAIN?"
570 INPUT YN$:IF YN$="Y" THEN 47
0
580 CLOSE#1
590 GOTO 10
```



```
STATUS GREAT SHAPE SCORE       950
                   HEALTH     6404
PAUSE KEY PRESSED  SHOT POWER    1
```

**Software** CoCo 1, 2 & 3

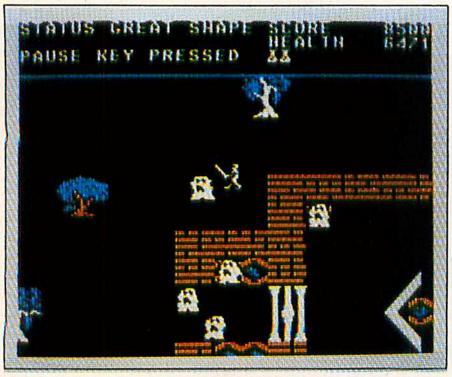
# *Wizard's Den* — A World of Poultices, Potions and Poisons

Cauldron boil and cauldron bubble . . . With that incantation, some luck, and a great deal of perseverance, the journey into another fantasy world begins. Over the years the CoCo community has been the beneficiary of countless graphic Adventure games. The announcement of yet one more could reasonably be anticipated with a chorus of yawns. But, as the old saying goes, "It ain't over 'til it's over." Tom Mix Software (Novasoft) is known for quality software, and with the release of *Wizard's Den*, they have breathed a bit of new life into an old routine.

*Wizard's Den* is based on the same concepts that have made other Adventure games so successful. A clever puzzle is wrapped in some very attractive graphics, with a taste of animation and sound added to good effect. The Wizard's world consists of eight chambers, each characterized by a unique group of poultices, potions, poisons, and the requisite monsters that seem to have an insatiable hunger for CoCo owners. Miscellaneous objects that confer various powers upon the owner are encountered along the way. But, beware! As I was merrily romping through Level 3, grabbing everything in sight (if I found it, it *must* be good for me!), several jugs of poison made their way down my throat — end of journey. Ultimately, eight levels must be traversed , and the Gem of Damocles found in order to win the game.

Several features set *Wizard's Den* apart. Most notably, it is very user-friendly. After loading, a color test is performed and the player is greeted by the opening menu. From here the method of play may be selected, either keyboard (the default) or joystick. If the joystick option is selected, all the keyboard sequences remain intact. As the documentation points out, this can be quite handy when maneuvering through tight places. From here the user may view an information screen displaying all the animated horrors that lie within, or enter the Wizard's world.

The combination of joystick and icon control allows the game to be played by anyone. Keyboard input, or anything else that resembles typing, is neither indicated or required. The Wizard welcomes children (of all ages).



While the documentation is adequate, the information screen provides more than enough detail to fully enjoy the game. No hints are provided, aside from an opening clue on exiting from Level 1, and a recommendation to maintain a lifestyle devoid of conflict.

*Wizard's Den* is supplied on a single unprotected disk, and requires a single disk drive and a minimum of 64K. The use of joysticks, while optional, greatly enhances the quality of play.

**(Tom Mix Software, P.O. Box 201, Ada, MI 49301, 616-676-8172; $22.95 plus $3 S/H)**

**— Henry Holzgrefe**

**Software** CoCo 1, 2 & 3

# *Artificial Learning File* — Simulates Artificial Intelligence

*Artificial Learning File* from High Altitude Software is a program designed to respond to the user by asking a series of questions, evaluating the answers, and then guessing a solution. If this sounds complex, it can be simplified by an example: When *ALF* is run, it presents the user with a menu. From the menu, the user picks and then selects an *ALF* file (for example, spaceships). *ALF* then loads the file and asks you to think of a spaceship. It then asks "yes" or "no" questions to determine which spaceship you are thinking of. Either *ALF* guesses right, in which case you can try another round, or *ALF* guesses wrong, in which case it asks you to enter a question to distinguish between its incorrect guess and your answer. It then asks you the answer (yes or no) to your question and the thing (for example, the type of spaceship) you were thinking of.

Now you are probably wondering, "Is this really artificial learning?" and "What can I do with it?"

The answer to the first question is no, this is not real artificial learning. This is a BASIC implementation of an artificial learning Simulation. In other words, the computer is not developing a knowledge base using a list processor, it is using BASIC and comparing responses to the responses it has in memory. It does look, however, to the user, particularly as the base of questions and answers grows, as though *ALF* is learning. Perhaps it is, but this is not artificial intelligence in the true, conventional sense.

As for what it can be used for, I would say two things. The first is entertainment, and the second is a demonstration of learning. Clearly the entertainment aspects are in watching the machine guess answers and evaluate questions. You can also see the learning process take place as you ask more and more questions.

In the Edit Question and Edit Answer portions of the program, *ALF* does not look at the last five items in either questions or answers for editing. This drawback, however, is not a serious problem, rather an annoyance when running the program. As your list grows, you will be able to access the questions or answers to edit.

Also, in scrolling through the answers or questions in search mode, the "shift-arrow" key combination does not scroll rapidly. While it is not exactly a problem, it shows a good idea that I think requires more development on the part of the programmer. In its current state, *ALF* is best described as an entertainment product. With some careful consideration as to what the goals for a final product might be, it could become a very valuable educational tool.

*ALF* comes with several files on the disk, including animals, cities, car parts, and more. There is room for 300 answers in memory at one time, and you also have the option to save all your answers and questions, and to create new *ALF* files. It would be a nice option to include a printer driver to be able to print out questions and answers. The disk also comes with a "bonus" program that gives advice by randomly answering yes/no questions with "Yes," "No," or "I don't know."

The documentation that accompanies *ALF* is relatively complete, consisting of three pages of menu explanations and some very good examples to get you started. I found these quite useful in gaining a basic understanding of the program and how to use it. Overall, *ALF* is entertaining and interesting.

**(High Altitude Software, 339 32½ Rd., Palisade, CO 81526; $8.95: First product review for this company appearing in THE RAINBOW.)**

**— Jeffrey S. Parker**

**Hardware** CoCo 3

# CoCo 3 Turbo Ram — 512K Upgrade

Performance Peripherals has released a new low-cost 512K upgrade for your CoCo 3. The upgrade, fully assembled and tested, is quite small, measuring 3¼ by 3 inches. The high quality glass epoxy circuit board is well made, and simply plugs into your CoCo 3. I was impressed. The 16 D41256 120 ns Dram chips are all socketed and are NEC brand.

The installation instructions are very easy to follow and, by far, the best I've seen for a CoCo 3 RAM upgrade. Every step is clearly detailed and illustrated with photographs so that even the novice can easily do the installation. No soldering is required, but as is the case with all RAM upgrade kits, you do have to clip two small capacitors on the CoCo 3 circuit board. This is not at all difficult since a small wire cutter will suffice, and the capacitors are well identified and illustrated in the photographs. You also have to remove the four chips that comprise the existing 128K RAM. Since these chips are socketed, you can simply unplug them and set them aside for safekeeping.

Particular emphasis is placed on proper grounding during the installation process so that the sensitive RAM chips are not damaged by static electrical charges at the work station. This is well documented, and common household materials such as aluminum foil are used.

In all there are eight steps to follow to install the board, and they can be completed in 10 to 30 minutes depending on your familiarity with electronic circuits. Caution: If you install this upgrade yourself, you will void your computer's 90-day warranty. If you are timid about such things, take your computer to your local Radio Shack for installation.

The kit also comes with a program on disk to check the operation of the newly acquired memory. An unusual feature of this particular program is that it relocates itself several times so that all of the memory is checked.

I should also point out that you can purchase the new PAL chip ($9.95) from these folks, too. You'll need this replacement chip if you have the older Multi-Pak interface (#26-3024). The same high quality step-by-step instructions and photographs are provided for PAL installation, as well. If you don't have a Multi-Pak, there's no need for the new PAL chip.

I highly recommend this 512K upgrade. Installation is easy, and it worked the first time. Its operation did not reveal any presence of unusual RF interference. If installation problems occur, a technical assistance phone number is provided, and the products are fully warranted for one year.

**(Performance Peripherals, 11432 Pena Way, Mira Loma, CA 91752, 714-681-3007; $79.95 plus $3 S/H)**

**— Jerry Semones**

**Software** CoCo 1, 2 & 3

## *Iron Cross: War in Russia* — Tactical Simulation

Close-up magicians such as myself sometimes pooh-pooh the extravagant shows of the stage magicians. "Sure," we say, "all those people and all that equipment. Try doing it at point-blank range, with only your wits, a deck of cards and two coins to work with."

The same attitude sometimes applies when wargamers who have been used to squad-level tactical simulations get involved with a strategic level war game. "Big deal; 60,000 troops, 350 tanks and all that artillery. Try it with eleven men with rifles, one machine gun and a mortar that can't hit half the targets." That was also my opinion since most of my CoCo war games are at the tactical level — until I started in with *Iron Cross: War in Russia* from Computerware.

This is simulation on a grand scale, with a corps being the smallest maneuver unit, set in the expanse of Russia in June of 1941. There is more to it than moving a panzer corps here and there, however. You have to keep an eye on the weather, as each game turn puts you one week closer to the muddy autumn and the dreaded Russian winter. You also have to keep track of the Soviet forces opposite you, and their relative strengths. The "inspection phase" allows you to examine strengths of both sides' units; the problem then is to remember them when you get into the movement phase. Note-taking isn't a bad idea.

The three types of units (armor, infantry and cavalry) are easily distinguished on a color screen (but not on an RGB monitor). Each unit can be given one of five different types of modes (e.g., standard, blitz, entrenched) depending on the situation.

Other factors to consider are supplies, the weather and air power. Air strikes are allowed in the top three of the five difficulty levels and are a real demonstration of their effectiveness on the battlefield.

Both our sons play war games, tactical and strategic. They taught me a simplified one. We went through four hours of dice rolls and interminable references to various tables of factors. In many ways it was like a short, intensive course in statistics with a quiz every 10 minutes. *Iron Cross* has removed the tables and the dice, replacing them with an interesting and highly playable game. It requires a CoCo 1, 2 or 3 with at least 64K of Extended BASIC and a disk drive.

The program, which is copy-protected, contains a save capability due to the possible length of any one game. The seven-page instruction book contains clear and concise rules that, while not absolutely simple, are easy to follow.

At first, the need to scroll up and down across the western breadth of the USSR in order to find and move my units irritated me. Then it dawned on me that it was a piece of realism, since commanders don't always know exactly what all their units are doing. A bit of computer-generated "fog of war" there.

So there I sat, likening myself to a von Rundstedt as my panzers slashed through the Russian lines, followed by the infantry corps nailing down the edges of the breakthrough. An imaginary aide brought me a cup of tea and a report from one of the army commanders. Leaning down, I gazed fiercely at the situation map, then firmly issued the new orders. `Panzer Corps will advance to take and hold Dromar`. The Russians were mounting a counterattack in the vicinity of the Crimea, and there was only one dug-in panzer corps securing that flank. They needed reinforcements — fast!

A drum roll interrupted my thoughts. I glanced up and could have sworn I saw the ghost of Harry Blackstone, Sr., smiling at me. "See?" he said as he floated a light bulb out over the audience. "It's not all that easy, is it?"

It certainly isn't, but it sure is fun. And you just might earn an Iron Cross.

**(Computerware, Box 668, Encinitas, CA 92024, 619-436-3512; $24.95)**

**— John Hebert**

**Software** CoCo 3

## *Zone Runner* — Futuristic Strategy Simulation

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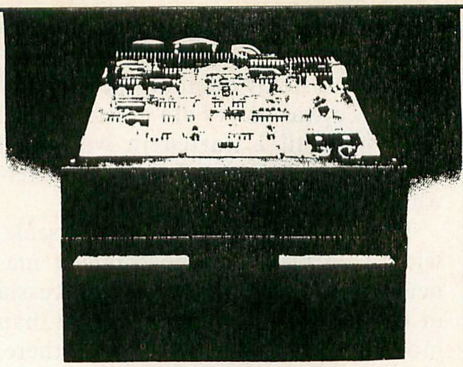

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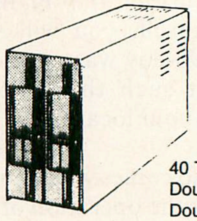

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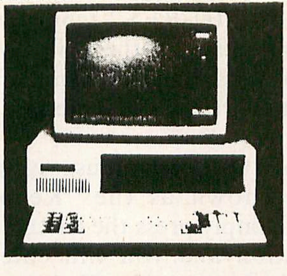

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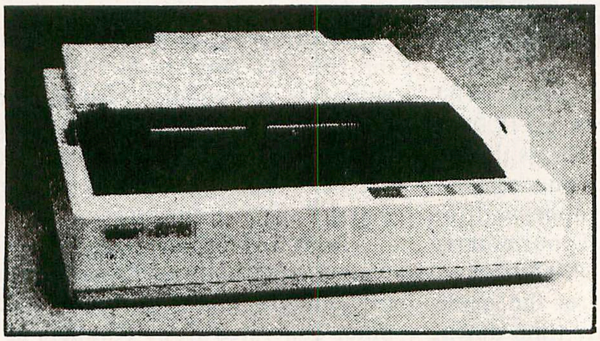

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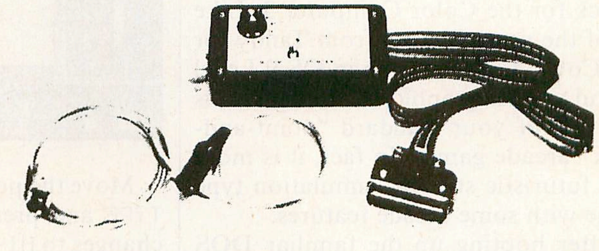

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*Zone Runner* is one of the latest offerings in games from Tandy/Radio Shack for the Color Computer 3. Like all of the new software from Tandy for the CoCo 3, it is written in OS-9 Level II and utilizes graphic windows. This is not one of your standard "point-and-click" arcade games. In fact, it is more of a futuristic strategy simulation type game with some arcade features.

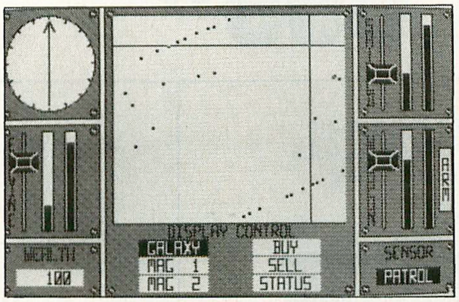
After booting up the familiar DOS command, you indicate the type of monitor you have by entering GW40 at the OS-9 prompt if you have an RGB monitor. Otherwise, you go directly into the game by entering the command ZONE.

The program creates a graphic control panel display on your screen and includes such items as a "Heading Control" and "Engine, Shield, and Weapons Controls."

The first thing to do is configure the screen and system to your liking and hardware requirements. Press F1, and a list of choices appears on the "Display Screen" in the center of the panel. Here you may change the foreground and background colors by scrolling through them until you get the combination you like best. Also, here you may indicate if you are using the Tandy Hi-Res Interface with your mouse or joystick. All control of the game is made in a "point-and-click" fashion with either a mouse or joystick.

If you boot up with the Hi-Res Interface in place, you will almost certainly have trouble making the pointer respond properly, as the game starts up in the normal mode, (i.e., it is polling the normal joystick port). This may seem like a real problem at first as you need to set the "MOUSE TYPE" parameter to "HI-RES" from "NORMAL" but can't get the pointer to go anywhere near the command area to change it. Fortunately, there is a solution.

Part of the OS-9 mouse system is what is known as the "Keyboard Mouse." Simply press the CTRL-CLEAR combination and you will enter the keyboard mouse mode. Then you can move the pointer around with the arrow keys. This is also referred to in the instruction manual for *Zone Runner.* However, the manual does not mention that while in the keyboard mouse mode, you will need to use F1 as a substitute fire button.



Move the pointer to the words MOUSE TYPE and press F1. The word NORMAL changes to HI-RES. Next, press the key combination CTRL-CLEAR once again to exit the keyboard mouse mode, and you should have full control of your pointer.

After you have made all the desired changes, pressing F2 starts the game. (You may go back at any time during the game and reconfigure the screen, as well.)

I did not find any particular advantage to using the Hi-Res Interface over the normal joystick port in playing *Zone Runner.* And, in fact, I finally decided that the hassle in configuring the game for the interface wasn't even worth it.

To set the "Heading Control," you are instructed to move the pointer to one of the direction hash marks around the perimeter of the compass circle and "lock it in with the press of a button." At first I tried moving the direction arrow, or compass needle, to the desired hash mark with the pointer, but soon found out that all I had to do was put the pointer on a hash mark, press the fire button and release, and the direction arrow would reposition itself.

Each of the Engine, Shield and Weapons systems have a small graphic "slider-lever" control. The manual indicates that all you need to do is point the pointer (indicator beacon) to each lever, raise it, and then press the button. What you really have to do is place the pointer on the lever knob, press the fire button, raise it upward, and once you have it where you want it, release the fire button.

To arm the Weapon system, simply put the pointer on the word ARM and press the fire button. I learned quickly that you have to re-arm the Weapon system for every torpedo you shoot.

The Display Screen has six modes, three of which provide various levels of magnification of your location in space. The other three are commands for the printing of various data on your Display Screen: a Buy list, a Sell list and a Status list.

Once you make contact with a planet, you may buy or sell goods. You start with 100 monetary units and an empty cargo hold. It only accommodates eight items at a time. By selecting BUY, you learn what that particular planet has to sell in the way of goods and the prices you must pay in exchange for them. Some planets will also sell engines, shields and weapons.

Selecting SELL with your pointer informs you how much the planet is willing to pay for the various items in your cargo hold. Sometimes the price will be even less than what you paid for the item, and at other times the profit margin will be tremendous.

The Status command is used to check your current status in the game. You are in competition with all the other computer generated Zone Runners as well as several other cargo ships. Depending on the amount of monetary units you currently have, your position on this list will be displayed. The main object of the game is to reach the top of this list. But the higher you are on it, the more attractive a target you become for pirates.

Now, this has its advantages, as the more pirates you attract, the more targets you have, and for each pirate you blow out of the space lanes, you are rewarded with additional monetary units.

Pressing the BREAK key at any time provides you with three options: quitting the game, restarting the game or resuming the game. It makes a handy pause button. Having a pause button should be an absolute requirement in any game so that you don't lose that tremendous score you're working on if you are interrupted, or as in my usual case, have a need to refresh your memory by frantically searching through the instruction manual for that command you forgot.

Unfortunately (and I think it should be an absolute requirement of all games to have one), *Zone Runner* does not have a high score save feature. I like to compete against myself and others, so it is nice to have some sort of high score saving provision in a game.

The game ends when you quit it, all the planets die out, or you achieve one of the ultimate rankings awarded by the game.

Now for the undocumented tip of the day: If you really want to climb up the Status list fast, there is nothing to stop you from occasionally turning pirate yourself and blowing a few of your competitors out of the spaceways. You'll pick up some real mega-bucks; but shoot fast, they are speedy little devils.

*Zone Runner* is well done, makes full use of the expanded features of the CoCo 3 and OS-9 Level II, and is very addictive. I highly recommend it.

**(Tandy Corporation, 1700 One Tandy Center, Ft. Worth, TX 76102, $29.95. Available in Radio Shack stores nationwide.)**

— **Kerry Armstrong**

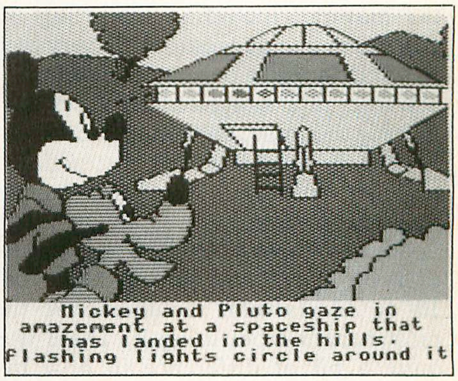
**Software** CoCo 1, 2 & 3 OS-9

# *Mickey's Space Adventure* — Travel the Solar System

Where's Pluto? He's with Mickey, traveling our solar system in search of pieces from a valuable memory crystal. *Mickey's Space Adventure* combines the appeal of two popular Disney characters, an Adventure game, and facts about the solar system in an entertaining and educational package.

As the game begins, Mickey and Pluto discover an alien spaceship has landed on Earth. After a little exploration, they find a computer inside the ship that explains its mission. The ship was sent to search for the remains of a lost crystal that contains the entire history of the planet Oron. It is up to Mickey, guided by the player, to recover all nine pieces of the crystal in the right order. To do this, the spaceship has to be flown to each of the planets of our solar system.

This Adventure game is similar to others in which the players have to go to different locations, get objects, and examine their surroundings for clues. Two-word commands are created from two lists of words printed at the bottom of the screen. The player simply uses the arrow keys and ENTER to make choices. When the player lands on a new planet, important information about that planet can be obtained to help make decisions about where to travel next and what equipment is needed.



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inside this Adventure. It would hard to imagine a child coming from the program without picking up at least some information about the planets. In addition to covering facts about the solar system, the program reinforces skills such as problem-solving, decision-making, and mapping. The 150 graphic scenes enhance the learning process by giving the player the illusion that he's really there.

Parents and teachers should note the list of educational objectives in the manual, as well as a glossary of terms and facts about the planets. The rest of the manual, including operating instructions and suggestions, is very well written. In addition, some enrichment activities are suggested for use after playing the game. Even though computers can be very useful as instructional tools, it's necessary for some human interaction, too.

*Mickey's Space Adventure* is advertised for ages 8 and up, but I feel that 10- to 12-year-olds would receive the most benefit from using it. There was quite a bit of difference in how my second-grade son and one of my sixth-grade students approached the program. Both could operate the program without difficulty. However, it was obvious that the sixth-grader, having some background in using and making maps, had a much easier time. Younger children will need some guidance from an adult to help chart their journey.

Unlike older Disney cassette-based games, *Mickey's Space Adventure* begins with a new game and different clues each time. This assures that it can be used over and over at home, or in school. Also, games can be saved and played later — a must for schools, since class time is limited.

The program was designed primarily for the CoCo 1 or 2, and uses artifact colors, which don't show up on the CoCo 3 when used with an RGB monitor. CoCo 3 users need a TV or color composite monitor to take advantage of its color capabilities. This is a minor annoyance, but expected, since there are a lot more CoCo 1 and 2s than 3s in use right now. Hopefully, Sierra On-Line will consider adding an RGB/composite option upon startup like some OS-9 programs that are currently on the market.

*Mickey's Space Adventure* deserves an 'A' for both entertainment and educational value. The manual is well-written and the program educationally sound. It is obvious that the authors and designers took a lot of care in its preparation. I would certainly recommend it as a fine addition to your Color Computer educational library.

**(Sierra On-Line, Inc., Coarsegold, CA 93614; $34.95. Available in Radio Shack stores nationwide.)**

**— Mark Haverstock**

**Software** CoCo 1, 2 & 3

## *Financial Time Conversions* — Help With Financial Decisions

Do you have a desire to try to figure out how much that credit card you love/hate is really costing you? Thinking about buying a new house or car and need to figure out how much you can borrow? Want to know how much those mortgage payments are really going to be? It's quite possible you may need some help. Oh, sure, a calculator can make the job easier, but what if you want to juggle some of the numbers, like interest rates that seem to change daily, or to see what the house payments will be with different down payments?

*Financial Time Conversions* is a BASIC program that has a series of menu-driven financial programs which can be used to figure out all the above problems and more. The program is geared to professionals and others interested in doing fairly sophisticated financial calculations.

The program is on disk, and the use of a printer is optional. It is not copy-protected, so backups can be made for your own use. There is nothing particularly difficult about using this program. Simply type `RUN FINCON`. The program asks if you'll be using a printer or not; a simple Y or N will do.

The menu choices include Present Value, Uniform Series Value, Future Value, Interest Rate Conversions, and Exit From Program.

The first choice offers a uniform series, a gradient series, a proportional series, or a future amount. The second and third selections offer uniform series values and future values, respectively. The fourth one allows conversion between nominal annual and effective annual interest rates.

Dale Tinklepaugh has informed me that he found an error in a portion of *Financial Time Conversions* that would effect the result of a conversion from a proportional series to a present value if the rate of increase were greater than the interest rate. The program will actually stop at a syntax error if this situation is encountered. The following change will make the program correct; for your original program disk and any backup copies, remove the write protect tab and type:

```
LOAD"FINCON.BAS"
1660 FA=(((X+1)^N)-1/X
SAVE"FINCON.BAS"
```

The program disk also has a backup file, `FINCON.BAK`. You may want to type `SAVE"FINCON.BAK"` to make sure all copies are correct.

After you've gone through the menu selection process, the program prompts you for the pertinent information it needs to perform the calculations, such as interest rate, time periods, dollar amounts, etc. The program does its

*Hint . . .*

### Cursory INKEY$

The `INKEY$` function does not stop when it is called. Rather, you must test the results of this function repeatedly with a comparison statement. When writing a program and testing this function, I find it is helpful to have a cursor appear when the computer is waiting for you to press a key.

To have the `INKEY$` function display such a cursor, use `POKE &HA56A,&HB1`. To restore this to its original state, use `POKE &HA56A,&HC1`. It is also possible to control the flashing of the cursor. To stop the cursor from flashing, use `POKE&HA1A6,0`. The "anti-poke" to restore the flashing cursor is `POKE&HA1A6,16`.

*Marc Gagnon*
*Cap-de-la-Madeleine, Quebec*

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thing, displays the answer and then prompts for either more calculations or a return to the menu.

Upon reading the manual that came with the program, I got the distinct impression I should have taken some finance courses. The terms used were not the everyday ones I was accustomed to. I thought maybe the nice people at the magazine made a mistake and sent this program to someone they thought was a businessman. But no, after reading it again, the examples were all concerned with things like mortgages and car maintenance cost tracking.

If you recognize the terms in the menu, you'll have no problems. Fortunately, for those of us who don't know them, the author provides some very simple examples in the manual. I ran all of them and they functioned as described.

I tried to make the program crash. Since it is written in BASIC, it's pretty easy to fool. Just type in outrageous numbers and it stops with an error message. I was not able to find any problems with the program using reasonable numbers. The answers I verified with a calculator were correct (using the formula in the program).

So, if you need some help solving those tough financial problems, *Financial Time Conversions* may be for you.

**(Prometheus Software, 14684 Joshua Tree Ave., Moreno Valley, CA 92388, 714-247-3254; $14: First product review for this company appearing in THE RAINBOW.)**

**— C.L. Pilipauskas**

**Software** CoCo 3

## *RAMDisk* — Speedy File-Handling

*RAMDisk* is a machine language program written by Bill Vergona of Cercomp and supplied on disk for your 512K CoCo 3. When installed, it provides your computer with two additional simulated disk drives. In my case, with drives 0 and 1 actually connected, this program resulted in the addition of drives 2 and 3 in RAM.

The program and its operation are totally compatible and transparent to Color BASIC, and the RAM disks added are treated just like any other physical disk drive as far as the computer is concerned. The big difference is that the RAM disks are lightning fast!

There is also another major difference. Unlike physical disks that can be removed from the drives and stored, any program, file or data stored in a RAM disk is lost when the computer is turned off or reset, so keep this in mind. The beauty of a RAM disk is in its data and file manipulation, but it should not be used for mass storage.

*RAMDisk* is extremely easy to install. Simply put the disk containing the program into Drive 0, type `LOADM "RAMDISK"` and press ENTER. When the program is loaded, it automatically installs itself and displays a copyright notice and the familiar `OK` prompt. *RAMDisk* automatically assigns drives 2 and 3, so if you already have drives 0 and 1, as I do, you end up with a total of four drives when you're done. A `DRIVE` command is available in the program to allow you to select which drive designations you want.

The supplied disk also contains a handy *RAMTest* program that is useful

## Corrections

**"PCLEAR0" (One-Liner Contest Winner, December 1987, Page 14):** Due to a typographical error, some of the parentheses in the listing were misplaced. The corrected line appears below.

```
10 POKE182,0:POKE183,PEEK(188):P
OKE184,0:POKE185,16:POKE186,PEEK
(188):POKE187,0:POKE188,PEEK(188
)-6:PCLEAR1:POKE183,PEEK(183)+6:
POKE188,PEEK(188)+6
```

**"A Desktop Publisher on a Shoestring" (October 1987, Page 58):** Several readers have been unable to get *Desktop Low* or *Desktop High* to work because of NE errors. These errors occur because the programs have been unable to find the needed font files. `GENFONT1` and `GENFONT2` must be run to create the files `FONT1` and `FONT2`. In addition, a disk containing these generated font files must be in Drive 0 before either version of the main program will run properly.

**"Caught Up in a Galactic Conflict" (November 1987, Page 78):** These corrections to *Galactic Conflict* were submitted by the author, Paul Alger. The following lines need to be replaced or added as appropriate:

```
1510 LINEINPUTZ$:IF LEN(Z$)>3 TH
EN GOSUB1530:RETURN ELSE Z=VAL(Z
$):RETURN

1530 IF VAL(LEFT$(Z$,1))>0 THEN
FOR LC=1 TO LEN(Z$) ELSE RETURN

1540 IF MID$(Z$,LC,1)="E" THENLC
=LEN(Z$):Z$="":Z=0:NEXTLC:RETURN

1550 NEXT:Z=VAL(Z$):RETURN

3715 IF Y(8)>1 THEN PRINT"Pay yo
ur old loan first!":GOTO3630

4405 IF X<1 OR X>SZ OR Y<1 OR Y>
SZ THEN PRINT"There is no starga
te here!":GOTO300

4730 IFX2>0 AND X2<SZ AND Y2>0 A
ND Y2<SZ THEN LC$=STR$(G(X2,Y2))
 ELSE PR$="*":GOTO4780
```

In addition, all references to the variable `Z` should be changed to `Z9` in lines 3470, 3472, 3475, 3477, 3480, 3482, 3485 and 3487.

**For quicker reference, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type `DATA` at the CoCo SIG> prompt and `INFO` at the TOPIC> prompt.**

to test your 512K memory expansion. This is somewhat redundant since most memory upgrades come with similar test programs. *RAMDisk* and *RAMTest* are not copy-protected, so backup copies for your own use are no problem.

If you have not yet explored the fun of using a RAM disk, then you are in for a pleasant surprise. *RAMDisk* provides you with extra file-handling at incredible speed, at a price you can't ignore.

**(Spectrum Projects, Inc., P.O. Box 264, Howard Beach, NY 11414, 718-835-1344; $19.95 plus $3 S/H)**

**— David Gerald**

Hardware CoCo 3

# Auto Dim — Protects Against Image Burn

If you are the kind of CoCo nut who has to have everything for your computer, then Auto Dim will interest you. It's a hardware device you hook up to your CoCo 3 that darkens the screen or your TV, composite monitor, or RGB monitor after a few minutes of inactivity.

Why would you need such a device? Well, it has been determined that if a high contrast image is left on the CRT (Cathode Ray Tube) screen for extended periods of time, that image can be burnt into the tube's phosphor. While I have never seen this happen on any of my computer screens, I have seen it occur on oscilloscope CRTs due to the high intensity traces usually found on such equipment. The high degree of contrast and image sharpness found on the CoCo 3 makes image burn a possibility.

Auto Dim hooks up to your CoCo 3 in a matter of minutes. The device consists of two integrated circuit chips that have been encapsulated in a clear Lucite-looking material. The small cube, which measures only 1¼ by 1¼ by ½ inches, looks like a half-melted ice cube with seven wires emanating from it. Each wire is terminated with a small connector clip so that solderless connection can be made. A piece of double-sided tape on the bottom of the cube allows it to be attached on top of the CoCo 3's RF modulator. Hook-up is quite simple and the entire operation takes only about 10 minutes. A three-page illustrated instruction sheet is supplied and contains step-by-step instructions to make it easy. Keep in mind, though, that you void your computer's 90-day warranty if you add this gadget, so you might want to wait until it expires before you hook it up.

You will never know you have Auto Dim hooked up until you leave your keyboard to answer the telephone or let out the cat. If no key is pressed, the screen will go blank after about 5½ minutes. On my CM-8 RGB monitor, the screen went black. The only indication that the monitor was still on was the red power indicator. Pressing any key upon returning to the computer restores the screen image.

Auto Dim is a nifty little package that is easy to install and has a useful purpose. I have one hooked up to my CoCo 3 and find it very reliable.

**(Lucas Industries 2000, 14720 Cedar St. N.E., Alliance, OH 44601, 216-823-4221; $29.95: First product review for this company appearing in THE RAINBOW.)**

**— David Gerald**

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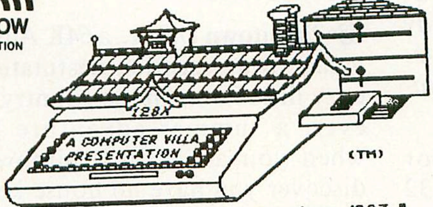

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# Received and Certified

*The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the* Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

**Color Talk 3**, a 64K terminal program. Features include screen display options for all CoCos, Xmodem and Ymodem protocols, saving to buffer or disk, ASCII filtering, conference chat mode, etc. For the CoCo 1, 2 and 3. *Computize, P.O. Box 207, Langhorne, PA 19047, (215) 946-7200; $49.95.*

**Data Master**, a 512K database manager for OS-9 Level II utilizing windows. The features include pull-down menus, dialog boxes, a LIST display format, nine different display and entry screens, file management, upload/download, etc. For the CoCo 3. *Computerware, 4403 Manchester Avenue, Suite 102, Box 668, Encinitas, CA 92024, (619) 436-3512; $64.95.*

**The Director**, a menu-driven animation utility that allows you to display CoCo 3 graphics pictures with time delays, color changes and BASIC or prerecorded cassette music. For the CoCo 3. *Seesof, P.O. Box 574, Beaufort, SC 29901, (803) 524-0116; $49.95.*

F **Hard Disk Organizer**, a utility that allows users to develop menu-driven pathlists so that application programs can be accessed from the hard drive with a single keystroke. Designed for application on an OS-9 Level II operating system. For the CoCo 2 and 3. *Robert Hengstebeck, 408 Grandview Avenue, Feasterville, PA 19047, (215) 322-5455; $24.95.*

F **LOT-PRO**, a program to help select lotto numbers for any state or country "Pick-Six" lotto game. Includes an option for a randomized wheeling system. For the CoCo 1, 2 and 3. *CJN Enterprises, P.O. Box 40487, Bakersfield, CA 93384, (805) 836-1323; $25.95.*

**PhantomGraph**, a 512K graph and chart creation program that offers simplicity for beginning drafters and varied capabilities for those more advanced. *DynaCalc* and *Sylk* file programs can be converted to *PhantomGraph* files. For the CoCo 3. *Tandy Corporation, 1700 One Tandy Center, Ft. Worth, TX 76102; $39.95. Available in Radio Shack stores nationwide.*

**Springster**, a 128K Hi-Res color graphics game. Maneuver through 32 different mazes in search of the Maze Melon. Battle bad guys, collect treasures and race the clock during your perilous quest. Three skill levels for one or two players. For the CoCo 3. *Tandy Corporation, 1700 One Tandy Center, Ft. Worth, TX 76102; $24.95. Available in Radio Shack stores nationwide.*

F **Stylograph**, a word processing system that allows you to type your file, modifying and correcting it as you go, and then print it out. For the CoCo 3. *Stylo Software, Inc., 482 C Street, Idaho Falls, ID 83402, (208) 529-3210; $199.95.*

F **Traintown U.S.A.**, a 64K Adventure game. Your vacation destination is a cozy little home in the country. However, a summer adventure begins when you arrive in Traintown and discover you have no house key, and there are no people to be found. For the CoCo 1, 2 and 3. *Software Deluxe, HCR 85 Box 292, Buffalo, MO 65622, (417) 345-8619; $15 plus $2 S/H.*

F **First product received from this company**

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

**— Judi Hutchinson**

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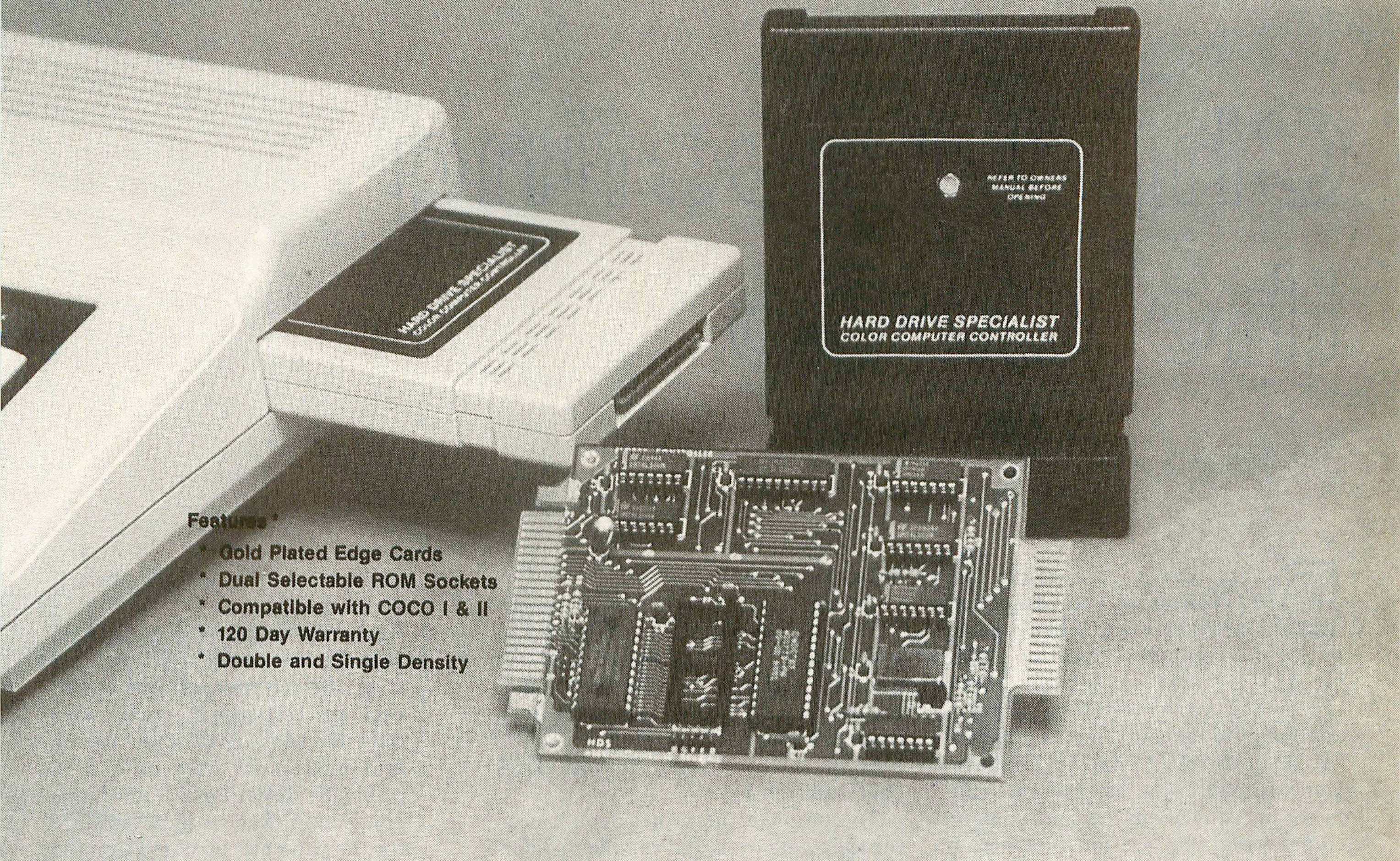
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*A simple keyboard-locking switch*

# Child-Proofing the CoCo

### By Ray Onley

Do you have a young child who likes to bang on the keyboard when you are out of the computer room for a short break? Or, maybe a child who likes to type in his or her spelling words in command mode and "new" happens to be one of them? Or, maybe you have a game on pause that can be reactivated by the pressing of any key, and someone comes while you are out of the room and presses a key for the heck of it? If you have these or similar problems, this very simple hardware project can help.

What this project does is lock the keyboard by a flip of a switch. This does not require any internal wiring or getting into the computer in any way, so it will not void your warranty. It is very simple and anyone can do it.

**How It Works**

Have you ever noticed that pressing the firebutton on either joystick locks up the keyboard so that none of the keys do anything? Well, this project works on the same principle: It shorts the firebutton line to ground in the joystick port.

*Ray Onley is a freshman at Forest Park High School, who started out with a 4K MC-10 in 1985 and has worked his way up to a 512K CoCo 3.*

**What You Need**

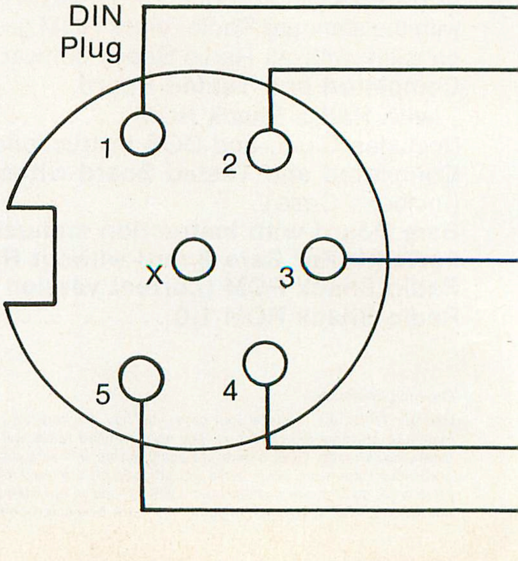
Be sure to obtain the exact six-pin jack and plug specified in the parts list. Even though you may notice that your joystick plug has only five pins, it is actually a modified six-pin DIN plug. (The cassette port and plug are examples of the standand five-pin DIN configuration.)

To complete the project you'll need the following tools and supplies: soldering iron, electrical tape, five lengths of about 22-gauge, 8-inch wire (in five colors), and a pair of needlenose pliers.

**How To Build It**

Now let's go through the project step-by-step. Be sure to follow the instructions carefully, because you will have trouble getting back into the canister later to fix an error.

1) Drill, poke, or melt two holes in the film canister, one in the center of the lid and one in the center of the bottom. Make sure the holes are big enough to fit the five wires. Next, on the canister's side, near the center, drill a hole big enough to fit the switch into.
2) The five wires will connect five of the six pins of the two DIN plugs. Pin 6 is ignored throughout this project, but you may wish to consider using an extra wire for this pin if you use a CoCo 3. Make a list or individual labels to identify the five colors as wire numbers 1, 2, 3, 4 and 5.
3) Cut wires #3 and #4 in half. Then, take the two pieces of Wire #3 and strip about ⅛ inch off one end of each piece. Loop the two pieces onto the same post of the switch and make sure they extend in opposite directions. Solder this connection. Repeat the procedure for the two parts of Wire #4 on the switch's other terminal.
4) Feed the five wires through the hole at the bottom of the canister, one at a time. Keep feeding them through the hole until the switch is even with the hole you made for it.



Then poke the switch through the hole and secure it with the top nut. Feed the other set of wires through the hole in the film can lid. Secure the lid on the can, pulling the five wires gently.

5) Take the jack and plug apart by inserting a small screwdriver tip into the locking slot, pulling it up and extracting the chrome part of the plug out of the black cover. Then take the chrome casing apart by just pulling it apart.
6) Important: Slip the black covers from the jack and plug onto the two sets of wires coming from the switch canister. Do it now or you will be sorry!
7) Follow your color code chart and solder wires 1 through 5 to pins 1 through 5 of the plug. The pin numbers are marked on the plug body. Do the same for the other set of five wires and the jack. Again, I emphasize that you need strip only ⅛ inch of insulation from the wire ends; that is all the bare wire needed for neat connections to the DIN plug and jack terminals. Too much bare wire could result in shorting.
8) Make sure that none of the bare wires are touching each other. If they are not, replace the chrome covers on the plug, then slide the black cover back onto the rest of the plug. Make sure that the hole in the chrome casing is lined up with the locking slot on the black cover. This makes certain that the cover is properly locked onto the casing. Repeat the process for the jack.

**Parts List**

| Qty. | Description | Price | Radio Shack Part # |
|---|---|---|---|
| 1 | 6-pin DIN plug | $1.29 | 274-020 |
| 1 | 6-pin DIN inline jack | $1.29 | 274-021 |
| 1 | Subminiature SPST toggle switch | $1.59 | 275-612 |
| 1 | 35mm plastic film canister | $0.00 | |

### Does It Work?

You are now ready to test your keyboard-locking switch. Insert the plug into the left joystick port and plug a free-float joystick into the jack of your newest CoCo accessory. Type something on the keyboard. If the letters do not appear on the screen, flip the switch and try typing again. If the letters appear on the screen, you know that the switch works as it should. If it is not working, skip the next two paragraphs and come back to this later.

After you have confirmed that the keyboard properly freezes, you need to check and see if the rest of the wires are connected as they should be. To do this, simply type in the following program:

```
10 PRINT@480, JOYSTK(0),
   JOYSTK(1);
20 GOTO 10
```

Run the program to see if the two numbers at the bottom of the screen change in accord with the X and Y movement of the joystick. If they do not, read on.

### If It Doesn't Work

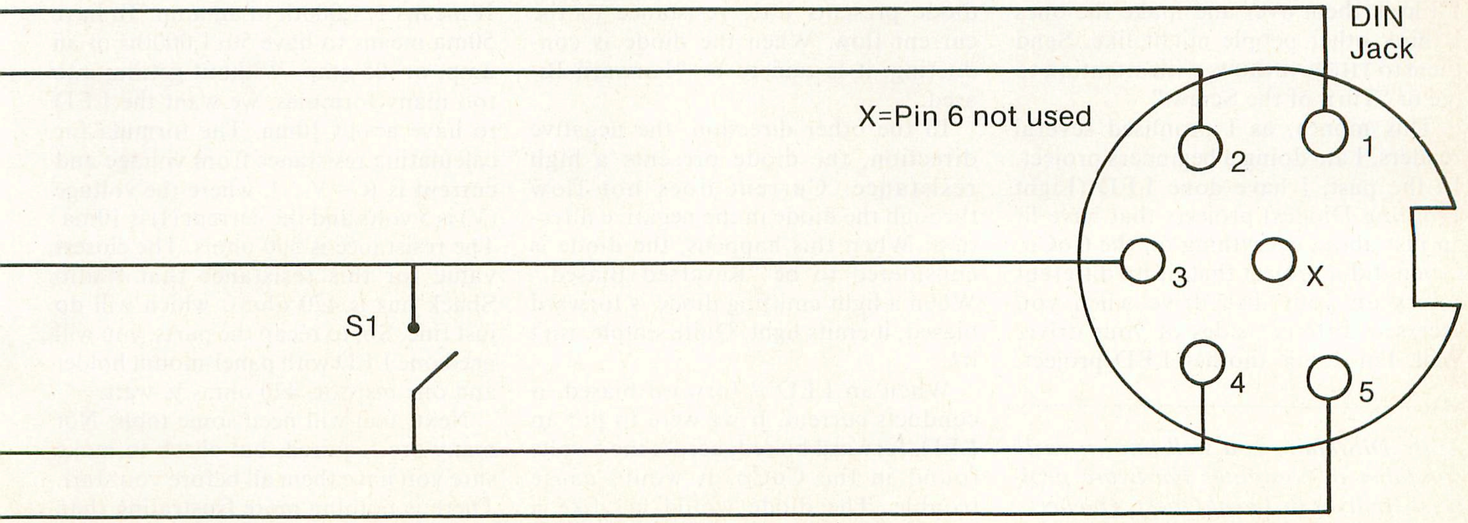
There is always a reason for something not working as it should. And it is usually better in the long run to carefully take a project apart and find out what is wrong than to smash it against a wall or crush it with a hammer, even though these methods are widely used "cures."

The following is a list of nearly everything that could be wrong with your project. If you have a multimeter or simple continuity tester, check all five lines in accord with the circuit diagram. Possible causes of project failure:

1) Incorrect wiring of wires 3 and 4 to switch
2) Switch terminals are shorted out by excess bare wire or sloppy soldering
3) Defective switch
4) Broken wire
5) Plug or jack terminals shorted by solder drop or stray wire strand
6) Mix-up among wires 1, 2 and 5 from plug to jack
7) Defective joystick

If you don't use or own joysticks, you can make a simple version of this project in just a few minutes. Use two short wires to connect pins 3 and 4 of a six-pin DIN plug to the terminals of the switch listed above or any other convenient SPST toggle or slide switch. Use creativity and some electrical tape to secure the switch neatly to the plug.

*(Questions may be directed to the author at 810 Cascade Road, Cincinnati, OH 45240. Please enclose an SASE when writing for a reply.)*



**Turn of the Screw**

*Light up the controller as it writes to disk*

# Beginners — Add an LED to Your Controller

**By Tony DiStefano**
**Rainbow Contributing Editor**

Thinking about the Princeton RAINBOWfest still excites me. If this RAINBOWfest is any indication of how the CoCo is doing, then long live the CoCo! This show was one of the best I've been to in a long time. The CoCo 3 seems to be doing very well. There were lots of new things for the CoCo 3 — both hardware and software. Look forward to seeing a few projects from me for the CoCo 3. I talked to a lot of people who read this column, and I would like to thank all my readers for their support, without which I would have stopped writing a long time ago.

Talking to RAINBOWfest goers gave me a few insights on the direction this column is heading. I received a lot of requests for "simple-to-do projects." Some people want to build something useful. Others say they want challenging projects. Well, why don't you send me your "Hardware Projects Wish List"? I'll look them over and make the ones I think other people might like. Send them to THE RAINBOW, with attention to me or "Turn of the Screw."

This month, as I promised several readers, I am doing a beginners project. In the past, I have done LED (Light Emitting Diodes) projects that have lit up just about everything on the CoCo. I even did a project that lit up different colors on your disk drive when you accessed different sides of your drive. Well, I'm doing another LED project, one I saw done on a disk controller a long time ago and have not seen since: an LED to indicate when the disk controller is writing to the disk.

This is a simple project requiring a minimum amount of tools and parts. The parts are available at your local Radio Shack, and there are only two needed. The first, of course, is an LED. Radio Shack has lots of them. I suggest you buy one that comes with its own panel-mount holder, as it is easier to install. The other part is a resistor. That's it — a simple project that costs under a dollar.

Before I get into the construction of the project, let's look into the theory of the LED. Figure 1 is the electrical diagram of an LED. An LED, as the name implies, is first a diode. A diode is an electronic component that lets current flow in only one direction; let's call it the positive direction, which is shown by the arrow in Figure 1. The diode presents little resistance to the current flow. When the diode is conducting, it is said to be "Forward Biased."

In the other direction, the negative direction, the diode presents a high resistance. Current does not flow through the diode in the negative direction. When this happens, the diode is considered to be "Reversed Biased." When a light emitting diode is forward biased, it emits light. Quite simple, isn't it?

When an LED is forward biased, it conducts current. If we were to put an LED, forward biased, across the 5 volts found in the CoCo, it would cause trouble. The diode would act like a short and cause the 5 volts to blow a fuse, as well as the LED itself.

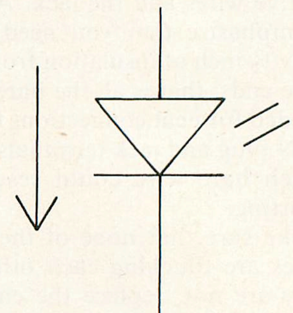


Figure 1

We need something to limit the amount of current flowing through the LED. This is where the resistor comes in. Current flow is measured in amps. A typical LED can handle up to 50ma. The term "ma" stands for "milliamp." It means 1/1,000th of an amp. To have 50ma means to have 50/1,000ths of an amp, or .05 amp. Without getting into too many formulas, we want the LED to have about 10ma. The formula for calculating resistance from voltage and current is R = V / I, where the voltage (V) is 5 volts and the current (I) is 10ma. The resistance is 500 ohms. The closest value for this resistance that Radio Shack has is 470 ohms, which will do just fine. So, to recap the parts, you will need one LED with panel-mount holder and one resistor, 470 ohms ¼ watt.

Next, you will need some tools. Not many are required, but check to make sure you have them all before you start. There is nothing more frustrating than

---

*Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.*

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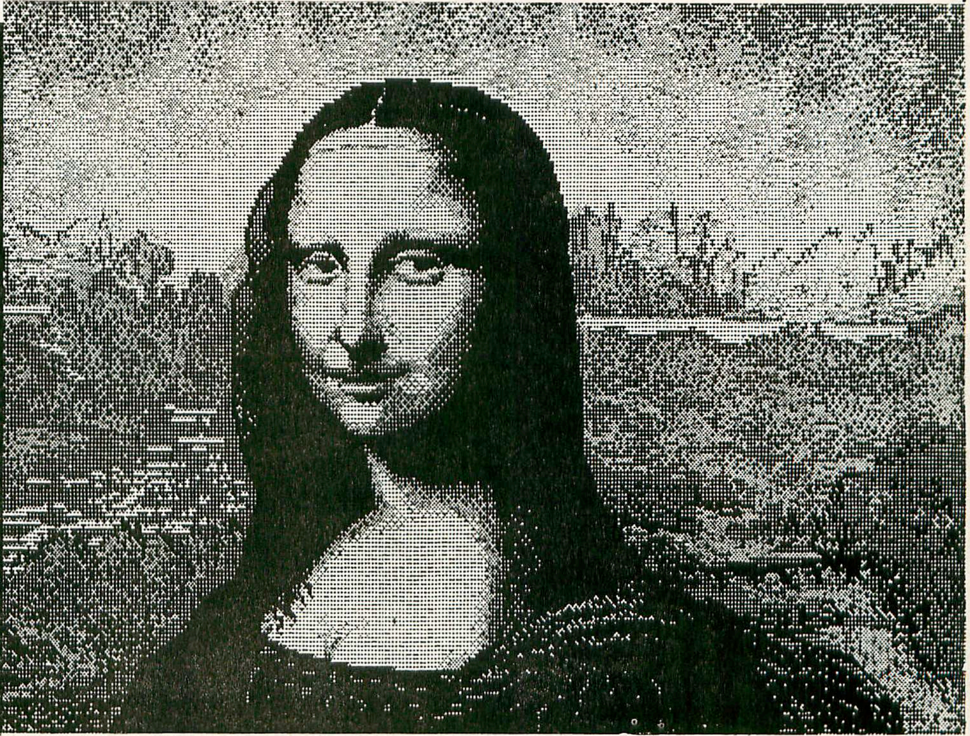

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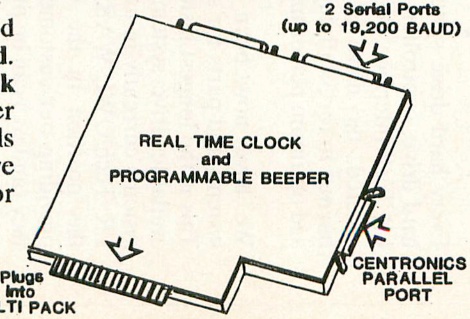

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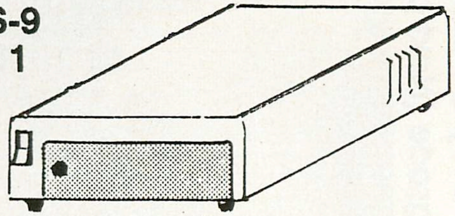

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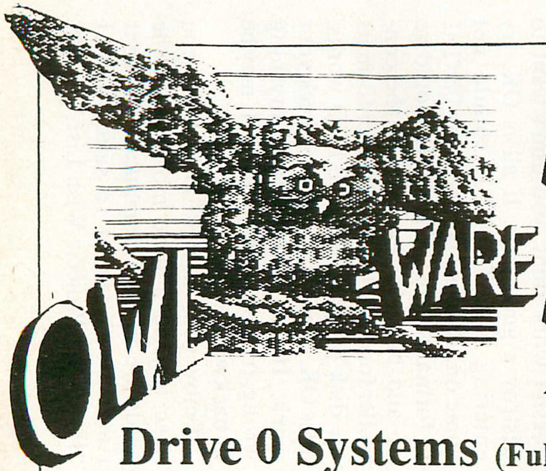

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starting a project and finding out that you are missing something. You need a soldering iron and solder, cutter/strippers, screwdriver (to match the screws that open your controller), and a drill and bit (to match the size of the LED mounting hardware). You will also need a few pieces of thin wire and electrical tape or shrink tubing.

Now we have all the parts and theory we need to start. It's time to get practical. In the controller circuit, there is an output that tells the disk drive hardware to go into the record or write mode. Like other signals that control the disk drive, it must reach the drive itself. This is done by the 34-wire connecting ribbon cable that plugs into the end of the controller. We will monitor this write signal with our LED. We want to hook up our LED so that it lights up when the controller is writing to the disk. The write signal is on Pin 24. This signal is available many places in the controller, but I chose this one because it is the only place common to all controllers, Disto, Radio Shack or any other.

When the controller is idle or reading, the level on Pin 24 is high, about 5 volts. When the controller is writing, the pin is low, or ground-level. We want to hook up our LED and resistor in such a way that the LED is on when this signal is low. Before reading on, think about it and try to design it by yourself. Does your design look like the one in Figure 2? If it does, reward yourself with a visit to the fridge. If it doesn't, study the circuit and see where you went wrong.

Here is the theory behind why I wired it up this way: As I stated previously, when the controller is reading, the signal is high (5 volts). The LED is also hooked up to 5 volts. Disregarding the resistor, if a diode (or our LED) has 5 volts on both sides, it cannot have any current flow. Therefore, the LED is off.

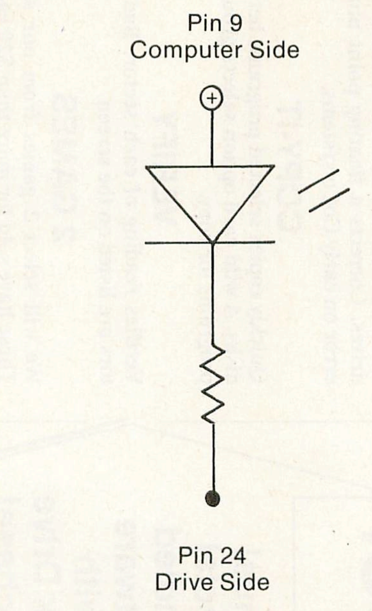

**Figure 2**

When the controller is writing, the signal is low. When the diode has 5 volts on one side and ground on the other side, it becomes forward biased and conducts. Therefore, the LED is on and shines brightly.

OK! Time to start constructing. Turn the computer off and remove the controller from the computer. Remove the controller's cover using the proper screwdriver. Locate Pin 24 on the connector that connects to the drives. Locating this pin may be a bit of a pain. On the top part of the connector are all the odd numbers. On the bottom part are all the even numbers. So, unless you can see where the pin leads, you will have to remove the controller from the bottom part of the case to get to Pin 24.

If you are looking at the bottom part of the connector, and the connector is pointing upward, Pin 2 of the connector is on your right. Count by two toward the left until you reach 24. Solder a piece of wire to that pin. Make sure you solder at the base of the pin and not at the tip. You will not be able to plug in the connector, otherwise. Run the wire out over the side of the controller and replace the bottom cover. Make sure the wire is long enough to reach the LED. Cut the ends of the resistor to leave just enough room to solder. Solder the wire to one end of the resistor. Solder the other end of the resistor to the short lead of the LED. Now solder another short piece of wire to the long end of the LED.

At this point you must find 5 volts somewhere. One place where I know that all controllers must have 5 volts is at the connector that plugs into the controller: on Pin 9 of the connector. It is on the top this time. Pin 1 of the computer connector is on the same side as Pin 1 of the drive connector. Solder the wire that comes from the LED to this pin on the computer side of the connector. That is all the soldering you have to do. Use black tape or shrink tubing to hide all of the exposed wires, including the resistor.

The only thing you have left to do is mount the LED. Find a suitable place on the cover to mount it. But you have to be able to see it when the controller is plugged into the computer, and the back side of the LED cannot touch the controller. If you have a Multi-Pak, you may want to make your hole on the end of the controller, so that the LED will be pointing up when it is plugged into the Multi-Pak.

Now close up the cover, and test it out. Set up your system and turn it on. Make sure you get your normal message. Put a blank or otherwise "non-useful" disk in the drive. If this circuit doesn't work right, you don't want to destroy a good disk. If all is OK, try entering `DIR`. The LED should not come on. If all is OK, try using `DSKINI` to format the disk. The LED should go on and blink for every track the controller formats. If the controller formats the disk properly and the LED works, all is OK. If not, go back and check your work. If you cannot find anything wrong, try reversing the LED. It may be in backward.

Enjoy your new LED. I hope you have learned a little more about the hardware in your computer. Till next time. Don't forget to send in that "Hardware Projects Wish List."

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# CoCo Powers the Amp

## By Marty Goodman
## Rainbow Contributing Editor

*I am trying to power a speaker amplifier (R.S. Cat. No. 277-1008) off a CoCo 3 to use as a source of sound with my monochrome monitor. Normally, it calls for a 9-volt battery. I hooked it to the output of IC36 (an 8-volt regulator) in the CoCo 3, but now occasionally my screen images disappear. Can you help?*

*Mark C. Smith*
*(MRMAJER)*
*Greenville, TX*

That 8-volt regulator (IC 36) is used to produce regulated 8 volts for the video circuitry of the CoCo 3. It has a very tiny rated current output (100 MA), and so it is not surprising that when you added the speaker amplifier to it, it got overloaded and went into thermal shutdown.

The correct way to power that speaker amp unit from the CoCo 3 is to hook it up directly to the unregulated DC supply of the CoCo, which tends to be about 10 volts. This 10-volt unregulated DC can be obtained from Pin 16 of IC 8, or from the plus terminal of C 29 (the 4,700 mfd main filter capacitor), or from the junction of D1 and D2.

---

*Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.*

### Accessing the Back Side

*I have a pair of double-sided drives, and normally can access each side of them using my system. However, some programs (*Rickyterm *and* KDSK*) don't seem to be able to access the back sides of these drives. The problem seems to be limited to those programs that do not use RS DOS calls, but rather have their own disk sector I/O routines (*DSKCON*s) in them. Can you help?*

*Fred Ahlberg*
*(FREDAHLBERG)*
*Kingston, NH*

You are quite right in identifying the problem as being the failure of certain programs to use your Disk BASIC's ROM routines. I would assume that your Disk BASIC (RS DOS, JDOS, ADOS, or whatever) has been modified in EPROM to define Drive 2 as the back of Drive 0 and Drive 3 as the back of Drive 1. (This is the most common, and most sensible, arrangement.)

When the programs in question circumvent the DSKCON routine in Disk BASIC they are unable to reach the back sides of your drives. In the case of *Rickyterm*, Don Hutchison has written some excellent modifications to it that will permit the sort of double-sided operation you desire. These should be available on Delphi now. In the case of KDSK, you would have to disassemble the program, find the DSKCON routine, locate the drive mask table there, and modify it. The drive mask table is usually located near the very end of the DSKCON routine. Check a disassembly of Disk BASIC (*Disk Basic Unravelled*, available from Microcom Software and Spectrum Projects) for details.

A second approach would be to make a *hardware* modification of your drives. Using a bunch of diodes or a quad OR gate, the drives can be set up as two logical drives on each side.

One approach would be to run the drive select 0 and 2 lines from the controller into the two inputs of an OR gate, and feed the drive select line on the drive with the output of that OR gate. Then also run the incoming drive select 2 line to the side select pin on that drive. (Do a similar thing for drive select 1 and 3 lines with the other drive). After such a modification is installed, you merely use any standard DOS ROM that is *not* modified itself for double-sided operation, and your two physical drives will work as if they are four logical drives, regardless of what RS DOS program you are using. This approach is wonderful for Disk Extended BASIC, but should *never* be done by users of OS-9, which requires that the drives be *unmodified* for proper use of double-sided drives.

### *Degas* to *Color Max*

*Is there a way to convert Atari* Degas *files to be viewed or modified on a CoCo 3 under Computize's* Color Max*?*

*Dave Lucas*
*Chicago, IL*

Greg Miller, one of the co-authors of *Color Max*, has provided a program to view *Degas* files, and I believe Computize may have a utility for converting them. The viewing utility is available on Delphi in the Graphics section. I would suggest a call to Computize about the converter utility.

### CoCo 3 Questions

*1) Does the CoCo 3 work with JDOS?*

*2) Is the JRAM 512K expansion board for use only as a RAM disk, or is it for the CoCo 3?*

*3) Are there bugs in the CoCo 3's ROM?*

*4) Does OS-9 Level II have icons and pull-down menus? I mean, is it "user-friendly"?*

*5) Is 512K of RAM needed for OS-9 Level II?*

*6) Can OS-9 Level II take advantage of a double-sided drive?*

*7) Is BASIC09 included in OS-9 Level II?*

*8) Is an editor assembler included with OS-9 Level II?*

*9) What is involved in making a CoCo 3 512K upgrade board?*

*Nicolaus Alber Borges Schrifer*
*Salvador, Brazil*

1) JDOS will not work properly with the CoCo 3. Of all previous patched DOS systems, only ADOS 3 (see Spectro Systems ad) will work properly on the CoCo 3, and that is because it was written from the ground up for the CoCo 3. I recommend it highly if you want an enhanced disk ROM for the CoCo 3.

2) J&R made a 512K add-on for the CoCo 1 and 2. This worked *only* as a RAM disk (or printer spooler). J&R also makes a CoCo 3 512K memory upgrade board, though this is a different item. Note that many other companies (PBJ, Disto, Hemphill and Owlware) also make CoCo 3 512K upgrade boards. All of these are advertised in RAINBOW.

3) The CoCo 3's ROM is riddled with minor bugs and badly thought-out design characteristics. A list of them would take up several pages. If you can log onto Delphi, we have lists of them posted there. None of these bugs are terribly serious, and all can be circumvented. None have any significance if you are running OS-9.

4-8) OS-9 itself is not at all user-friendly. It is a pure, ancient, prompt-oriented operating system, designed for programmers and *not* for users. This is as true of Level II as it is of Level I. Any user-friendliness about OS-9 software must be created by the individual programmer.

But Level II does provide for programmers creating icons and windows, and, when Multi-Vue is available, will support creation of elaborate graphics interfaces with relative programming ease. But it does *not* come with its own standardized graphics interface of particular icons, screen images, and the like. OS-9 Level II *does* come with BASIC09 included. An editor assembler is not included. For that you would have to buy the "Developer's Kit."

Although OS-9 Level II will run on a 128K CoCo, 512K is absolutely required to make any use of most of its unique and desirable features. So, for virtually all intents and purposes, I would say there is no point in getting OS-9 Level II unless you also own a 512K CoCo. All versions of OS-9, especially OS-9 Level II, support a wide variety of disk drives with great ease, including double-sided 40- and double-sided 80-track drives (360 and 720K type drives).

9) CoCo 3 512K upgrade boards are electronically quite trivial, consisting only of sixteen 41256 memory chips and associated .33 mfd deglitching caps, and one 10 mfd filter cap. Some manufacturers use 33 ohm anti-ringing resistors. Making up the board, however, is quite tedious. And a decent printed circuit board with proper layout of power and ground planes is required for the thing to run properly. Do *not* try to hand wire such a thing! Overall, I would say it is a waste of time to make one's own 512K board. Instead, I strongly recommend you order one of the half-dozen or so different varieties available via RAINBOW magazine ads. If you insist on doing it yourself, complete information about such boards is available in the service manual for the CoCo 3, which is available from Tandy National Parts (Cat. No. 26-3334).

### Choosing a Monitor

*What is the best low-cost monitor capable of 80-by-32 display? I want a true monitor, not a TV made to look like a monitor. And what about video drivers?*

*Ernie Bennett*
*Beckley, WV*

I am sure you meant to write 80-by-24, not 80-by-32, because 80-by-32 is never used, while 80-by-24 is the industry standard. Anyway, no ordinary television is capable of displaying 80-by-24 character screens. Almost *any* composite video monochrome monitor will be excellent for your purpose. Many companies advertise such monitors in RAINBOW for $60 to $90 each. There is relatively little difference among makes and models. The main thing to consider is color (green vs. amber vs. white letters). Individual units vary in terms of anti-glare properties and cabinet styling. Usually such variations are of minimal significance. Be sure *not* to get an "IBM-type" or "TTL monochrome" monitor. What you want is a composite video-type monochrome monitor.

Note that the CoCo 1 and 2, which require a video driver in order to be used with a monitor, cannot display a readable 80-column screen. Only the addition of a Word Pak RS and a Multi-Pak Interface will solve that problem. Even then, very little software works with the Word Pak. Instead, if you need 80-column display, the *only* sensible approach is to get a CoCo 3. Now, the CoCo 3 has its own composite video output, so no special video driver is needed. You will, however, need to use software that allows you to turn off the color burst signal, or select a white on black character set, in order for the image to be clearly readable on a monochrome monitor.

### Quest of the Memory Map

*I need to know how the memory manager of the CoCo 3 works, and about what its memory map is like. Where can I get this information?*

*Bob Toronchut*
*Newbrook, Alberta, Canada*

The information you seek is available in the Tandy Service Manual for the CoCo 3. Merely ask your local Radio Shack store to order the "Service Manual" for the CoCo 3 (Cat. No. 26-3334), or call Tandy National Parts in Fort Worth and directly order it. The price is about $14 (American).

**Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.**

**We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.**

**Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form which has complete instructions.**

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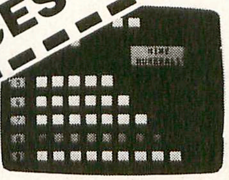

### ① MATH/FRACTIONS

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MF 5 — Reducing fractions, lowest terms
MF 6 — Proper fractions, mixed numbers
MF 7 — Multiplication-division of fractions
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MF 9 — Addition of mixed numbers
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MF 11 — Converting decimal numbers
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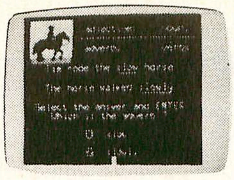

### ⑤ THE MAGIC OF SPELLING

Grades 4 to 8

MS 1 — Plurals: branches, rodeos, valleys
MS 2 — Plurals: houses, brushes, candies
MS 3 — Plurals: babies, pianos, leaves
MS 4 — Suffixes: boxed, referred, writing
MS 5 — Suffixes: paid, quickly, extremely
MS 6 — Suffixes: said, confusion, school's
MS 7 — Homonyms: two, too, to; their, there
MS 8 — Homonyms: our, are, hour; ate, eight
MS 9 — Homonyms: weight, wait; who's, whose
MS 10 – Homonyms: scent, cent; sell, cell
MS 11 – Homonyms: dew, due; course, coarse
MS 12 – Homonyms: cite, site, sight; by, buy
MS 13 – Homonyms: blue, blew, creek, creak
MS 14 – Homonyms: sale, sail; steel, steal
MS 15 – Spelling by Syllables: letter, color
MS 16 – Doubling Consonant Letters: hollow

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# The BASIC Versions

### By Richard E. Esposito
### Rainbow Contributing Editor
### with Richard W. Libra

*I have recently obtained a CoCo 2 from a friend and am having a hard time trying to figure out what version of Color BASIC I have. Is there an easy way to obtain this information?*

*Scott Peterson*
*New London, CT*

℞ Simply type `EXEC 41175` and the start-up logo with the version number will be printed on your screen.

### Those Mysterious Keys

*What are the ALT, CTRL, F1 and F2 keys used for on the CoCo 3? There is no mention in the instruction book of these keys.*

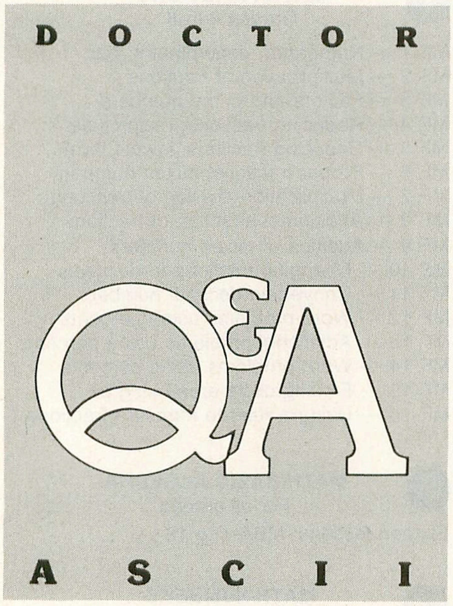
*Paul Scholz*
*Cotati, CA*

℞ The ALT and CTRL keys are primarily for OS-9 Level II. These four keys were added to fill in the keyboard matrix, and all four can be used with custom software that directly accesses the keyboard rollover table. The HJL custom keyboard has supplied these keys for years, only HJL called them F1, F2, F3 and F4.

---

*Richard Esposito is a senior project engineer with Northrop Corp. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.*

*Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.*



### The Doctor Tells All

*What kind of hardware is included in your personal computer setup?*

*James Sutton*
*Brooklyn, NY*

℞ I have a CoCo 3 with a JramR 512K upgrade, a down-under controller, two TEAC 55F 80-track, double-sided drives, a Radio Shack Line Printer VIII, a Radio Shack Direct Connect Modem I (300 baud), a Multi-Pak interface, a Magnavox 8CM515 RGB monitor, a Speech/Sound Pak and an RS-232 Pak. I also have a 64K CoCo 1 with the original Word-Pak, a Graphics Tablet, and a 40-track TEAC 55BV drive with an old Radio Shack 12-volt controller. In addition to that, I have an MC-10 with a tape recorder, a Model 100 laptop, and a Sharp PC-7000 (a portable Compatible).

### VDG Upgrade

*I have a CoCo 2 that I bought three years ago. I thought I read somewhere that the newer CoCo 2s use a different or improved VDG. Is this true? Can I upgrade to it? If so, how difficult would it be?*

*Donald G. Campbell*
*(DONCAMPBELL)*
*Greenwood, IN*

℞ The newest CoCo 2s use the 6847-T1, but it is not a direct drop-in replacement. See Tony DiStefano's "Turn of the Screw," November 1986, Page 88, for information on mating this newer VDG to your old CoCo.

### A CoCo PC?

*I'm thinking about adding a hard drive to my system. I have a CoCo 3 with OS-9 Level II, Multi-Pak and a Radio Shack disk controller. If I change to a Disto controller and add on a hard drive controller, can I buy just a bare hard drive or do I need something else? How large a hard drive can we use? Why couldn't an MS-DOS be written for the CoCo, as everyone knows the 6809 is far superior to the 6502 used in the Commie and Apple?*

*Kenneth A. Barnett*
*Anchorage, AK*

℞ The most popular hard drive CoCo system is one with the LR

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LINE CROSS REFERENCE: #148
LIST/DIR PAUSE: No more flybys! #149
LOWERCASE COMMANDS: #150
MASS INITIALIZATION: #152
ML/BASIC MERGE: Merge ML & Bas. Progs. #153
MESSAGE ANIMATOR: Great Billboard! #154
ML TO DATA CONVERTOR: #155
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NUMERIC KEYPAD: Great for numbers. #157
ON BREAK GOTO COMMAND: #158
ON ERROR GOTO COMMAND: #159
ON RESET GOTO COMMAND: #160
PHONE DIRECTORY: #161
PAUSE CONTROL: Put programs on hold! #162
PROGRAM PACKER: For Basic Programs. #163
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RAM DISK: In-memory disk drive. #165
REPLACE: Find/replace strings. #166
REVERSE VIDEO (GREEN): Eliminates eyestrain. #167
REVERSE VIDEO (RED): Eliminates eyestrain. #168
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SUPER INPUT/LINEINPUT: #174
SUPER COMMAND KEYS: #175
SUPER COPY: COPY multiple files. #176
SUPER EDITOR: Scroll thru Bas. Progs. #177
SUPER PAINT: 65535 patterns! #178
SUPER REPEAT: Repeat Key. #179
SUPER SCROLLER: View Scrolled Lines. #180
TAB/SHIFT LOCK KEYS: #181
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Tech interface. These systems and individual components are sold by Owl-Ware, P.O. Box 116-D, Mertztown, PA 19539, (800) 245-6228. In order to run MS-DOS on the CoCo, you would need an 8088 coprocessor board, and, since the CoCo's memory and hardware are mapped differently, it would require a significant amount of additional hardware for full PC-compatibility. Since this would most likely be a specialty item (spelled HIGH PRICE), I do not foresee such a device, especially in the light of cheap PC Compatibles.

### The Trying "Retry"

*I keep getting a "retry" (repositioning of disk heads) while formatting/verifying all disks on OS-9 Level II. This "retry" occurs only on double-sided 80-track operations on Track 70/71 (Hex). I've tried three different disk controllers and removal of the Multi-Pak. The "retry" occurs on both /d0 and /d1, and does not occur under single-sided operation on Level II or Level I or with 80-track patches under RS-DOS. This "retry" doesn't seem to hurt anything, only occurs once, and always "gets by." Is this a bug in OS-9 Level II software?*

*Brad Zvonar*
*Grand Ledge, MI*

℞ 'Tis only a minor inconvenience: Once formatted, I know of no one having problems with any of these 80-track, double-sided disks. However, many people have reported "strange" happenings when trying to use one of the older 12-volt disk controllers under Level II. These controllers don't work correctly at Level II's 2MHz.

### Poke Monochrome Fix

*I have just bought a VM-4 monochrome monitor to use with my CoCo 3. The display on power-up is not clear at all; however, using the following pokes from a previous* RAINBOW *issue,* `POKE &HEE033,16-POKE &HE03C,19` *and* `POKE &HE045,19`, *makes the display after changing the colors perfect. Is there another way of getting the same results permanently? When using program packs and my modem I can't use the pokes.*

*Stuart T. Smith*
*Cliffside Park, NJ*

℞ If you have an EPROM made of ADOS-3, you can customize it for monochrome before having it burned.

*I have a CoCo 3. When I hook a monochrome monitor to the video connectors on the back, I notice about six diagonal lines on the screen. This happens when the border is anything but black and when using either the* `PMODE` *or* `HSCREEN` *modes. Is this a common problem? If so, is there a solution?*

*Peter R. Pankhurst*
*Winnipeg, Manitoba*

℞ See previous letter for pokes.

### Dirty Heads

*I purchased the Tandy cassette recorder CCR 81 and use only Tandy computer cassette tapes. Lately I have had great difficulty storing data on the cassettes.*

*Marty Povondra*
*Omaha, NE*

℞ If you are a heavy user of cassettes, consider the possibility of dirty heads on your recorders. Head-cleaning kits are readily available and may very well solve your problem.

### McMillions of Control Codes

*I own a CoCo 2 and have a Star NX-10 printer. I would like to know what printers are compatible with other printers in control codes.*

*Toby Bauer*
*Gig Harbor, WA*

℞ That's a tall order. Printers are like McDonalds' hamburgers, millions & millions. The ones to consider are those that are IBM Proprinter-, Epson-, or Tandy-compatible.

### Tracking *CoCo Util II*

*In the September, 1987 column, you mentioned the program* CoCo Util II. *Where can I get it?*

*Andy Dater*
*Boston, MA*

℞ *CoCo Util II* is sold by Spectrum Projects, P.O. Box 264, Howard Beach, NY 11414, for $39.95.

### Hot CoCo

*My CoCo 3 seems to be overheating after about an hour of use. I have the Disto 512K upgrade installed. After an hour's use, the system crashes; I have run several 512 MEM tests — they either crashed or gave a bad RAM at block $0E, location 1C01. The heat sink on the left-hand side of the motherboard was quite hot and the satellite MEM board was warm. After a shutdown of about 1½ hours, everything runs OK for about an hour, then the system crashes again. Any ideas?*

*Franz C. Shattuck*
*Hillsboro, NH*

℞ You have a fairly common problem with CoCo 3s that can usually be easily solved by adding a small external muffin fan to cool your CoCo's interior.

### A Simple Cassette Merge

*Your method of merging cassette programs is admirable, but it is needlessly complex. A simple* `OPEN #-1, "FILENAME": POKE111,255: EXEC&HAC7C` *merges* `FILENAME` *with the program in memory, exactly like the disk* `MERGE` *command.*

*Note: The file to be merged must be saved in ASCII format, i.e.,* `CSAVE "FILE",A`.

*Alan T. DeKok*
*Kanata, Ontario*

℞ Thanks for the information.

### OS-9 Hard Drivers

*I recently acquired a Western Digital WD1000-TB1 disk controller and a Seagate ST-412 10-Meg hard disk. Does anyone have an adapter and drivers for OS-9 Level II?*

*Robert B. Brogdon*
*Watauga, TX*

℞ Yes, contact Owl-Ware regarding their LR Tech interface. Complete systems and individual components based on this interface are sold by Owl-Ware, P.O. Box 116-D, Mertztown, PA 19539, (800) 245-6228.

### Disk *EDTASM* on CoCo 3

*How can I use disk* EDTASM *with my CoCo 3?*

*Josh Abrams*
*Brooklyn, NY*

℞ Thanks to Roger A. Krupski for the following patches for disk *EDTASM*, which will allow proper operation in 40-width and 80-width on the CoCo 3. To make *EDTASM* boot up automatically rather than having to type `EDTASM`, just add the following line to the `DOS.BAS` program: `1 REMEDTASM`. Note there is no space after `REM`. Use the following program to make the necessary patches to `EDTASM.BIN`:

**The listing:** `PATCH`

```
100 ' COPYRIGHT (C) 1987 BY:
110 ' ROGER A. KRUPSKI
120 '
260 A$=HEX$(PEEK(&HFFFE))+HEX$(P
EEK(&HFFFF))
270 IF A$<>"8C1B" THEN CLS:PRINT
"ONLY FOR THE COCO-3!":END
280 POKE &H9692,17
290 PCLEAR 16
300 POKE &H9692,9
310 PALETTE 12,63
320 PALETTE 13,0
330 WIDTH 32:CLS:VERIFY ON
340 IF FREE(PEEK(&H95A))<7 THEN
PRINT"DISK TOO FULL!":END
350 PRINT"PATCHS FOR DISK EDTASM
 TO RUN"
360 PRINT"ON THE COCO-3 IN 80 CO
LUMNS"
370 PRINT
380 PRINT"INSERT A COPY (NOT ORI
GINAL)"
390 PRINT"OF YOUR DISK EDTASM AN
D PRESS"
400 PRINT"<ENTER> WHEN READY TO
PATCH"
410 A$=INKEY$
420 IF A$=CHR$(13) THEN 440
430 GOTO 410
440 PRINT"LOADING EDTASM..."
450 RENAME"EDTASM.BIN" TO "EDTAS
M.OLD"
460 LOADM"EDTASM.OLD"
470 PRINT"PATCHING EDTASM..."
480 READ AD$,DT$
490 IF AD$="END" THEN 520
500 POKE VAL("&H"+AD$),VAL("&H"+
DT$)
510 GOTO 480
520 PRINT"SAVING PATCHED VERSION
..."
530 SAVEM"EDTASM.BIN",&H1600,&H4
A7F,&H1600
540 PRINT"DONE!"
550 PCLEAR 4:CLEAR 200,&H7FFF:NE
W
560 DATA 1617,84, 1643,31, 1D18,
7F, 1D19,FF
570 DATA 1D1A,DE, 1D1B,6E, 1D1C,
9F, 1D1D,FF
580 DATA 1D1E,FE, 1D1F,12, 1D20,
12, 1D21,12
590 DATA 1D22,12, 1D23,12, 1D3F,
BD, 1D40,A1
600 DATA 1D41,B1, 1D42,12, 1D7A,
10, 23B8,31
```

### PRINT# Problems

*I have always had trouble with the BASIC statement for* `PRINT#`*. If there are more than two items of data, I cannot use commas between them as shown in the instruction manual. It works on tape but not on disk. All of the data items are given to the first variable. To be able to use this statement, I must give each item of data its own* `PRINT#`*. I am using the J&M controller with RS-DOS and a CoCo 3 with 128K.*

*Rob Cloud*
*Detroit, MI*

℞ Each `PRINT#` statement generates a record in your data file. If you have an `INPUT#` statement similarly configured, it can read in those values from your file.

**For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.**

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*Tips for the OS-9 beginner*

# Stalking the Fire-Breathing Dragon

### By Nancy Ewart

Adventure gaming is no way near as mentally invigorating as the challenge of OS-9 programming. Once you have conquered the first puzzle of making a bootable system disk configured with the modules and commands you choose, you can use some of the many applications that are available under OS-9. You can put text editors, programming language compilers or games to work quite easily.

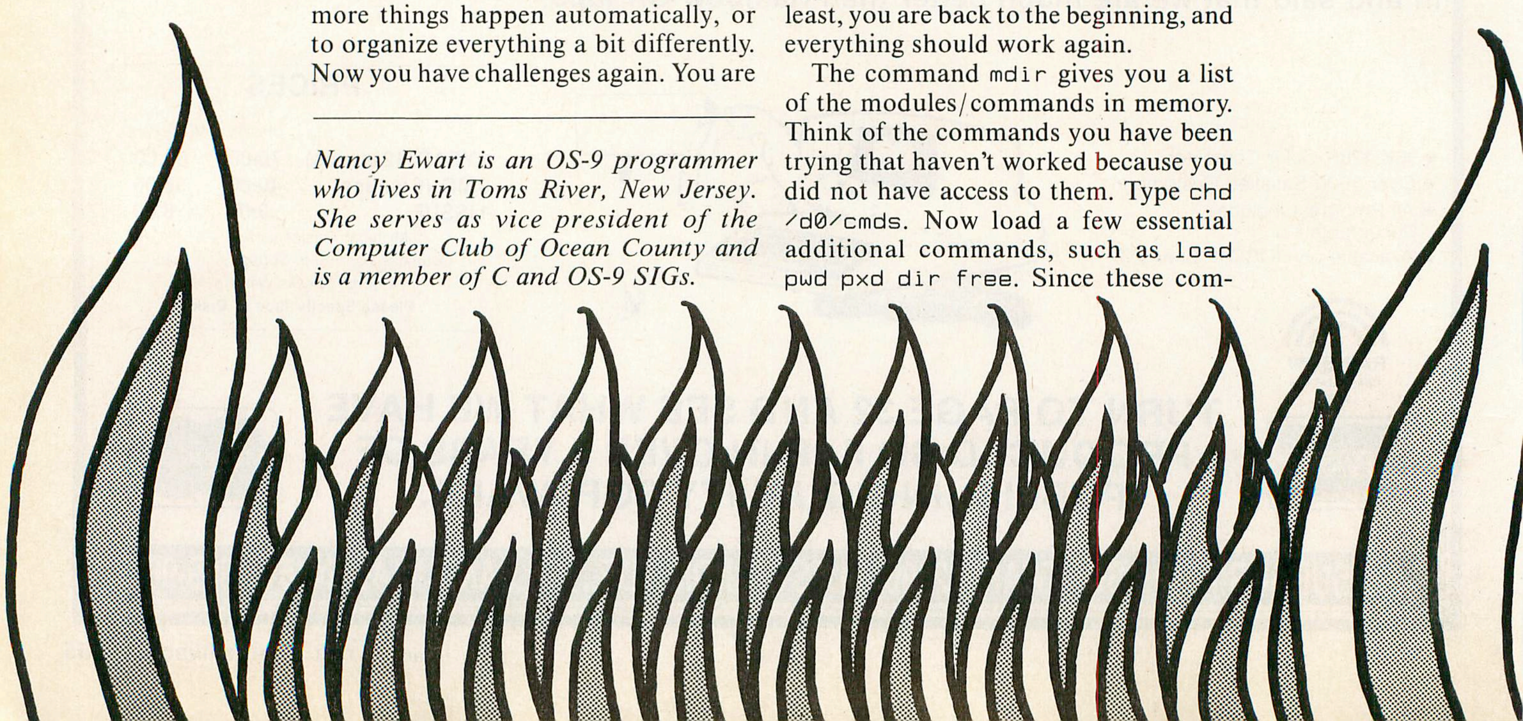
The time comes, though, when you want to change things around a bit — to eliminate unnecessary steps, to make more things happen automatically, or to organize everything a bit differently. Now you have challenges again. You are dealing directly with the system, stalking the fire-breathing dragon.

*Nancy Ewart is an OS-9 programmer who lives in Toms River, New Jersey. She serves as vice president of the Computer Club of Ocean County and is a member of C and OS-9 SIGs.*

You are in the middle of OS-9 kingdom and nothing works! You are getting errors right and left, north and south. Even `pwd` gives you an error. You are truly a lost dog in high weeds. What has most likely happened is that you have changed your execution `CMDS` directory to a data directory or to a `CMDS` directory with limited commands.

For a quick fix, find yourself by putting your system disk in Drive 0. Type `chd /d0; chx /d0/cmds`. Now, at least, you are back to the beginning, and everything should work again.

The command `mdir` gives you a list of the modules/commands in memory. Think of the commands you have been trying that haven't worked because you did not have access to them. Type `chd /d0/cmds`. Now load a few essential additional commands, such as `load pwd pxd dir free`. Since these com-



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mands are now in memory, they will be there no matter which directories you change. This problem does not crop up for Level II users as often. One of the reasons Level II has the reputation for being more friendly than Level I is that there are more commands loaded into memory when you boot up.

For a long-term method of keeping track, build a new start-up file that will load a few extra, useful commands. Tandy's *Getting Started with OS-9* has excellent directions for changing `StartUp`. Another approach is to be sure that any OS-9 commands on an OS-9 disk are actually placed in a `CMDS` directory, and then copy frequently used additional commands from the system disk to the application disk. Never *ever* do a `chx` to anything but `CMDS`. The BASIC09 Level I disk comes with the commands in the root directory rather than in a `CMDS` directory, with the idea that the user can transfer them to the `CMDS` directory of a system disk. This has caused no end of confusion in the CoCo world.

### BUILD and ECHO

The concept of the `build` command is great — you can make files like `StartUp` that are a collection of commands and messages to yourself to make life easier. Many of my best inventions are little one-command files with very short names, usually one to three letters, that save typing a long command line. A file named `Red` uses the `display` command to construct a large, red overlay window on a full-screen device window; `Erase`, also using the `display` command, erases any overlay window, window-by-window, each time you type it. Using `build` in this way leads to a better understanding of macros as you gain experience.

There are some traps for the unwary in using `build`. If you include any command that asks the user to enter information, be sure to redirect that information from the terminal, as in `setime </term` for the Level I "start-up" file. One of the first things you may want to `build` into `StartUp` for Level I are upper- and lowercase letters. The command to do that is `tmode .1 -upc`. Since spacing is critical, let me present that a different way: `tmode`(space) `.1`(as in number)(space)`-upc`.

If you want the screen to print out any helpful messages during the running of the file, use the command `echo`. Once, with great enthusiasm for what `build` can do, I built an entire file of helpful things to remember from one OS-9 session to another, ran the file and, of course, got absolutely nothing. I could list the file and see the information, but it wouldn't run. It took only a little hair-pulling to remember that I should have used `echo`.

The biggest hassle with `build` is making mistakes and trying to correct them with `edit`. If you haven't learned how to use an editor or word processor yet, you might go ahead and take the time to learn `edit`. When it finally dawned on me that I could use a familiar OS-9 word processor to build the files instead of laboring with `build` and `edit`, I cut down on misspent time a thousandfold. However it is executed, the idea of putting a collection of commands into a short file is still a very useful concept.

### Using DSAVE

Putting a collection of commands into a file is what `dsave` is all about. `dsave` lets you copy all the contents of a disk to another disk, which may or may not be formatted with a different number of tracks. It also lets you copy the contents of a single directory to another, or the contents of a directory and all its subdirectories to a different place. You would need to use `copy` for moving individual files. However, it is simpler and quicker to use `backup` when transferring an entire disk's contents to a similarly formatted one.

The first encounter with `dsave` occurs frequently after using the `config` program to change the number of tracks on a disk. You get this beautiful capability of formatting 40 tracks, double-sided, but your system disk stubbornly stays at 35, single-sided. 630 vs. 1,440 remains just out of your grasp. But the answer is simple: `dsave -b /d0 /d1 ! shell`. Put your newly configured 35-track disk in Drive 0. Type `format /d1 r` *"diskname"* and press ENTER. This formats the disk in Drive 1 the way you chose in the `config` program.

After formatting, do a `free /d1` just to make sure it has the proper numbers on the new disk. Then enter the above command using the following spacing: `dsave` (space) `-b` (space) `/d0` (space) `/d1` (space) `!` (space) `shell`. As `dsave` scrolls down your screen, watch the construction of the commands that appear. Get a feel for what is happening. The `-b` in the command line makes a bootfile on the new disk; if you forget it, you'll have wasted a lot of time preparing a system disk that doesn't boot.

The `!` is a pipe. Do include all the pipes when using `config` to make a new system if you want to use `dsave` in this fashion. It's the easiest way to use `dsave`.

Sometimes, however, you want to be more selective — to transfer only part of the contents and not the whole shebang. This is difficult for many beginners; let's see if it can be made more comprehensible. First, study the `copy` command, because the essence of `dsave` is `copy`. Let's say you have a file called `Letter.to.Tandy` in the root directory of Drive 0 and you want to copy it to the Drive 1 directory called `COCO`. Every once in a while you have to gather all your scattered files and organize them into a system, or you will begin to lose items — and that's a real time waster.

If Drive 0 is to be the system disk, you can proceed; but if both disks are data disks, you will need to do a `load copy` before removing the system disk. Type `chd /d1/coco`. It seems easier to copy into rather than out of your working directory, and this command positions you in the receiving directory. In our example, you would type `copy /d0/letter.to.tandy letter.to.tandy`. You need to give the complete pathlist for the file to be copied, because you are not in that directory. You need only the filename — not the pathlist — for the new file, because you are already in that location. You can rename the file in the process simply by substituting the new name for the second repetition. This means you can copy a file into the same directory by renaming it in the process: `copy #20k /d0/letter.to.tandy tandy.jun8.87`, for example. The `#20k` governs the amount of memory used during the transfer.

The next step is to copy several files using the `build` concept. Suppose you need, as I did, to take several files with you into different directories so that your word processor will work correctly. You could call the program you are building `Word.pr` and put it on the system disk in a directory called `UTILITIES`. Here is an example of such a file:

```
t
tmode .1 -pause
load copy        (remark - if needed)
copy #20k /d0/UTILITIES/tspars tspars
copy #20k /d0/UTILITIES/tsword tsword
copy #20k /d0/UTILITIES/fontctrl fontctrl
copy #20k /d0/UTILITIES/word.icon word.icon
unlink copy
tmode .1 pause
```

When the occasion arises that you need these files in any directory, just change your working directory into the one you want using the `chd` command.

Then type: (space) `/d0/utilities/word.pr`. Since this is exactly the file that `dsave` builds when you use that command, you now have done what that command does. One small step further gets you into `dsave`.

When you use `dsave`, it sets up all the conditions and commands for you so you won't have to do much typing. Remember, `dsave` will copy the entire directory you are in and all the directories underneath it unless you use the `-l` (that's an "el," for level) option, which limits it to just the level where you are. You must first do a `chd` inside the directory you want to copy, then `dsave /d0 >/d0/copy1`. This line presumes that the directory you want to copy is on Drive 0. Your working directory could be anywhere on that Drive 0 disk; all you need for this pathlist is the drive number. The > redirects the output to the file `copy1` also on Drive 0. When you get this far, list `copy1` and you will see that it follows the same format as the file `Word.pr` above.

Beware! Another pitfall is coming. If `copy` is already loaded into memory, you may get an error that may or may not abort the program. I solved this by editing out `load copy` and `unlink copy` before running the second part of `dsave`. Now, to finish everything up, do a `chd` to the drive and directory you want the files to be in and type (space) `/d0/`*directory.name*`/copy1` just like you did for `Word.pr` above. This time you do need to use the entire pathlist to do a `copy1`.

You have additional problems if one directory is on a data disk in Drive 1 and the other is also on a data disk, but this time in Drive 0, and there is no system disk. You would leave the system disk in during the first part when `dsave` is making the transfer program. After that, load into memory all of the commands used in the transfer file before you remove the system disk, and insert the receiving data disk.

### DELDIR and ATTR

If you load `deldir` into memory to take it with you for use in deleting directories on data disks, you run into the same kind of problem that you had with `dsave`. `deldir` calls `attr` to enable it to make the final deletion of the directory itself. If `attr` is not in memory also, the program will abort after deleting all the files and before scrubbing the directory name.

### CMDS and Pathlists

Try pressing CTRL-A, which duplicates the previous command to cut down on typing. If you want to type `copy #20k /d1/sources/pizza.c pizza.c` followed by `copy #20k /d1/sources/getput4.c getput4.c`, use CTRL-A to print out the second line. Backspace to eliminate the two `pizza.c`s, and substitute the two `getput4.c`s. If the pathlist is the same and the command is different, as in `list /d1/sources/oldsources/hello.c` followed by `chd /d1/sources/oldsources/hello.c`, type (space) `chd` and press CTRL-A. You put the space before `chd` to give that command the same number of letters as `list`. For Level I you would use CLEAR-A instead of CTRL-A.

Familiarity with these commands makes the OS-9 encounter easy and rather fun, and tames the programming dragons into purring house cats.

---

*(Questions or comments may be directed to the author at 1861 Skiff Court, Toms River, NJ 08753. Please enclose an SASE when requesting a reply.)* ☐

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## KISSable OS-9

# Back at the Drawing Board

### By Dale L. Puckett
### Rainbow Contributing Editor

Last month, we gave you a sneak preview of `KISSDrawPut` and discussed several different ways to save the drawings we have been creating. We settled on a method that used graphic objects stored in a special data type. Each object became one element in an array that stored an entire picture. After you finished drawing your picture, you stored your entire picture on a disk with the BASIC09 `PUT` statement, `"PUT #FilePath, Picture"`.

Because of the size of the *KISSDraw* project, we were unable to publish all of the details in one month. This month, we start the new year by providing those details. You'll find updated listings for `KISSdMenu`, `KISSDrawFill`, `SetUpMouse`, `WhichTool`, `DoEvent`, and the routines you need to draw boxes, lines, circles, ellipses and bars. The heart of our new approach will be found in the tutorial that follows the subhead, "What is a line?" After you have these new procedures running, you will want to pack each of them into BASIC09 i-code modules and then merge them into one file. After you do this, you will be able to load them into your main OS-9 memory — outside your BASIC09 workspace. This will free memory in your workspace so you can work with the new *KISSDraw* features we hope to present in future columns.

We start by showing you a method of saving your work with an OS-9 pipeline in the procedure `PipeIt` and discussing the pros and cons of an approach that does not lend itself to the job at hand — saving graphics drawing commands on the fly — but is quite appropriate for many other tasks.

Before this month's column is finished, you'll find out how to pass information from one BASIC09 program to another through a pipeline, and we'll show you new ways data structures can make your programs faster and programming easier.

### Building a Pipeline

Several years ago at a Microware seminar, Robert Doggett, one of BASIC09's authors, demonstrated how to create a pipeline from within a BASIC09 program. We wanted to give it a try this month because we thought it might give us a handy way to send the drawing commands put out by `gfx2` to the screen and a disk file at the same time. It worked, but it didn't work. We wound up with a file that could redraw our artwork, but the process slowed down the program. It also created a large file because all of the mouse movement and `PUT` cursor commands were being recorded also. Additionally, because of the way OS-9 expands its files, we wound up with extra garbage at the end of the file that doesn't add any aesthetic appeal when you reload. We decided to take a different approach.

We list the procedure `PipeIt` here, however, because we think you will find it handy in many other BASIC09 programs you're writing. `PipeIt` requires four parameters — two of type `byte` and two of type `string`. The first byte holds the path number of the pipe it creates and the second holds the standard path. The strings hold the name of the program module you want to pipe data to and any parameters required by that program.

We called `PipeIt` with the lines shown below. Since essentially all of *KISSDraw*'s output to the screen takes place in the procedure `DoEvent`, we ran `PipeIt` to open up a pipeline to the OS-9 utility program `tee`, redirected the output of our drawing routines to this pipeline and then ran `DoEvent`. After `DoEvent` draws a bar, box, etc., on the screen, it returns and we once again redirect *KISSDraw*'s output to the screen.

The `tee` process started by `PipeIt` opens up a file named `testout` to receive the drawing data. After you exit *KISSDraw*, you can redisplay your artwork by merging the file `testout` to the screen by typing `merge testout`.

When we ran this test, we added a byte field named `Pipe` in the *KISSDraw* data type named `Stats` and added a byte named `OutPut` in the data type named `cursor`. We also did a global edit of all `gfx2` commands in *KISSDraw* so that each command contained the name of an output path.

---

*Dale L. Puckett, who is author of* The Official BASIC09 Tour Guide *and co-author, with Peter Dibble, of* The Complete Rainbow Guide to OS-9, *is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale is a U.S. Coast Guard lieutenant and lives in Rockville, Maryland.*

For example, `Run gfx2("clear")` became `Run gfx2(ButtonEvent.Pointer.OutPut,"clear")`.

We also added the statements shown in Table 1 at the start of *KISSDraw*:

```
  DIM MyProgram:STRING[4]
  DIM MyParams:STRING[8]
  DIM Pipeline: BYTE
  DIM StdPath:BYTE
  ButtonEvent.Pointer.OutPut:=1
  StdPath :=0
  MyProgram:="tee"
  MyParams:="testout"
Here is the calling code:
  Run PipeIt(Pipeline,StdPath,MyProgram,MyParams)
  ButtonEvent.Status.Pipe:=Pipeline
  Run DoEvent(ButtonEvent)
  ButtonEvent.Pointer.OutPut:=1
```

**Table 1**

File `PipeIt` away in your bag of BASIC09 tricks.

**Listing 1:** `PipeIt`

```
PROCEDURE PipeIt
 0000      (* Creates a pipe to send output of KISSDraw to a Tee filter
 003C
 003D      TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:

            INTEGER; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE

            ; X2,BDX,BDY:INTEGER; Stat,Res:BYTE; AcX,AcY,WRX,WRY:

            INTEGER
 00AE
 00AF      TYPE stats=event,InWindow,InToolBox,InMenuBar,line,box,circle

            ,ellipse,bar,arc,fill,text,freehand,RecordOn:BOOLEAN; XXX

            ,YYY:BYTE; ZZZ:STRING[4]; WWW:STRING[40]
 010E
 010F      TYPE cursor=OutPut,Scale,ScreenType,NoCur,arrow,pencil,cross

            ,hourglass,NoIcon,TextBar,Scross,Icon,IconBuff,pattern

            ,horzline,vertline,slantright,slantleft,dots:BYTE
 0162
 0163      TYPE packet=mouse:rodent; status:stats; pointer:cursor
 0180
 0181      TYPE REgisters=CC,A,B,DP:BYTE; X,Y,U:INTEGER
 01A6
 01A7      PARAM Pipeline:BYTE
 01AE      PARAM StdPath:BYTE
 01B5      PARAM Module:STRING[4]
 01C1      PARAM Params:STRING[8]
 01CD      DIM Regs:REgisters
 01D6      DIM Program:STRING[4]
 01E2      DIM Parameter:STRING[8]
 01EE      DIM SavePath,SysDup,SysFork:BYTE
 01FD
 01FE      Program:=Module+CHR$(13)
 020A      Parameter:=Params+CHR$(13)
 0216      SysFork=$03
 021E      SysDup=$82
 0226      CREATE #Pipeline,"/Pipe":UPDATE
 0236      Regs.A:=StdPath
 0242      RUN SysCall(SysDup,Regs)
 0251      SavePath:=Regs.A
 025C      CLOSE #StdPath
 0262      Regs.A:=Pipeline
 026E      RUN SysCall(SysDup,Regs)
 027D      Regs.A=0
 0288      Regs.B=0
 0293      Regs.X:=ADDR(Program)
 02A1      Regs.Y=LEN(Parameter)
 02AE      Regs.U:=ADDR(Parameter)
 02BC      RUN SysCall(SysFork,Regs)
 02CB      CLOSE #StdPath
 02D1      Regs.A:=SavePath
 02DD      RUN SysCall(SysDup,Regs)
 02EC      CLOSE #SavePath
```

If you decide to continue to use `gfx2` commands in your version of *KISSDraw* instead of following us into the wonderful world of graphic objects, here's an alternative to `PipeIt`. Rewrite each of the procedures that output a graphic object, repeating the line that outputs the final object twice. We personally don't like this approach since it violates the concept of consolidating all the output from a program in one place.

If you use this approach, the first line will go to your screen on the standard output path like it does now. The second line uses the optional path number. You will also need to put the second line in an `IF-THEN-ENDIF` statement that sends the output only if the `Event.Status.RecordOn` flag is true. At the same time you set this flag — probably in a procedure named `SavePix` — you must also open an output file and store its path number in `Event.Pointer.OutPut`. Here's how the first and second lines would look:

```
RUN gfx2("box",Horiz,Vert)
If Event.Status.RecordOn THEN
     RUN gfx2(Event.Pointer.
     OutPut,"box",Horiz,Vert)
ENDIF
```

### We Call it KISSDrawPut

During the testing we renamed the *KISSDraw* procedure and file so we could keep them separate from all other versions on our disks. The "Put" comes from the fact that we now use the BASIC09 `PUT` statement rather than the `gfx2` command to display an object on the screen.

There were several reasons we wanted to try this approach. First, we guessed that the program would run much faster. It did. We were pretty sure it would make the job of saving our drawings in a disk file easier and much faster. We also thought the increased speed would be impressive when we were ready to redisplay our work by loading a picture from disk. We were right! And finally, we thought it would allow us to edit objects in our drawings later. We haven't gotten that far yet, but we're sure it will.

Much of the increased speed comes from the fact that when you use the

BASIC09 GET and PUT statements, no conversion of data is needed. An exact copy of the bytes that make up a data type in memory are sent to the output path. It doesn't make any difference what the data type looks like. Let's look at the data types in KISSDrawPut. If you're new to this approach, you may think it's magic.

### What Is a Line?

Let's start with a line. To draw an object that looks like a line we need a tool — a pen perhaps. For now, we'll assume the line will start where the pen is resting. It will run to another location on the screen, which can be defined by a horizontal and vertical pixel address. The first thing we need, then, is a data type definition for this object we call a line. Since we know that we are going to want to do the same thing with bars, boxes and circles, etc., we'll keep our definition generic. We defined a data type named `object`:

```
TYPE object=DCode,HorP,VerP:
INTEGER
```

With BASIC09, after we define a new data type, we must reserve a place in memory to store it. We use the DIM statement to do this. Let's call our new variable `pen`. That seems like a good metaphor since we often draw with a pen in the real world.

```
DIM pen:object
```

We now have a place to store a pen that we can use to draw a line. To use it we must define our line and initialize it in memory. Within OS-9 all of the drawing primitives are defined by the escape code, ASCII `$1B`, followed by an additional byte. To put a line on the screen, we must send `$1B` followed by `$44`. In OS-9 speak, that means `$1B44` is a line. It may not look like it, but it is. Let's proceed:

```
pen.DCode:=$1B44
pen.HorP:=100
pen.VerP:=50
```

We now have a line stored in a memory variable named `pen` waiting to happen. To make it happen, we must put it on the screen:

```
PUT #1, pen
```

That's all there is to it. Now, what will we need if we want to redraw that same line later? It appears that the only thing

**Listing 2:** KISSdMenu

```
PROCEDURE KISSdMenu
 0000     (* Procedure to draw 'tools' menu bar on screen
 0030
 0031     TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:
           INTEGER; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE
           ; X2,BDX,BDY:INTEGER; Stat,Res:BYTE; AcX,AcY,WRX,WRY:
           INTEGER
 00A2
 00A3     TYPE stats=IsEvent,InWindow,InToolBox,InMenuBar,line,box,circle
           ,ellipse,bar,arc,fill,text,freehand,RecordOn:BOOLEAN
 00E2
 00E3     TYPE cursor=OutPut,Scale,ScreenType,NoCur,arrow,pencil,cross
           ,hourglass,NoIcon,TextBar,Scross,Icon,IconBuff,pattern
           ,horzline,vertline,slantright,slantleft,dots:BYTE
 0136
 0137     TYPE codes=DArc,DBar,DBox,DCircle,DEllipse,DLine,DPoint,DFill
           ,DSetPtr,DPutCur,DSetCur,DLogic,DPattern:INTEGER
 0172
 0173     TYPE object=DCode,HorP,VerP:INTEGER
 0186
 0187     TYPE orgin=DPSCode,HanX,HanY
 0198
 0199     TYPE packet=mouse:rodent; status:stats; pointer:cursor; Code
           :codes; Pen:object; Handle:orgin
 01CE
 01CF     PARAM Event:packet
 01D8
 01D9     DIM vert:INTEGER
 01E0     RUN gfx2("pattern",0,0)
 01F5     RUN gfx2("logic","off")
 0208
 0209     (* We'll draw an outline of the menu bar first
 0237
 0238     Event.Pen.DCode:=Event.Code.DSetPtr
 024D     Event.Pen.HorP:=10
 025B     Event.Pen.VerP:=10
 0269     PUT #1,Event.Pen
 0276
 0277     Event.Pen.DCode:=Event.Code.DBox
 028C     Event.Pen.HorP:=40
 029A     Event.Pen.VerP:=178
 02A8     PUT #1,Event.Pen
 02B5
 02B6     (* Now we need to fill in the individual boxes
 02E4     FOR vert=22 TO 178 STEP 12
 02F9       Event.Pen.DCode:=Event.Code.DSetPtr
 030E       Event.Pen.HorP:=10
 031C       Event.Pen.VerP:=vert
 032B       PUT #1,Event.Pen
 0338
 0339       Event.Pen.DCode:=Event.Code.DLine
 034E       Event.Pen.HorP:=40
 035C       Event.Pen.VerP:=vert
 036B       PUT #1,Event.Pen
 0378     NEXT vert
 0383
 0384     (* Now we'll add the icons
 039E     (* First, an Icon that means 'Draw a Line'
 03C8
 03C9     Event.Pen.DCode:=Event.Code.DSetPtr
 03DE     Event.Pen.HorP:=12
 03EC     Event.Pen.VerP:=20
 03FA     PUT #1,Event.Pen
 0407     Event.Pen.DCode:=Event.Code.DLine
 041C     Event.Pen.HorP:=38
 042A     Event.Pen.VerP:=12
 0438     PUT #1,Event.Pen
```

```
0445
0446        (* Now an Icon for a Box
045E        Event.Pen.DCode:=Event.Code.DSetPtr
0473        Event.Pen.HorP:=14
0481        Event.Pen.VerP:=24
048F        PUT #1,Event.Pen
049C        Event.Pen.DCode:=Event.Code.DBox
04B1        Event.Pen.HorP:=36
04BF        Event.Pen.VerP:=32
04CD        PUT #1,Event.Pen
04DA
04DB        (* A Circle is our next Icon
04F7
04F8        Event.Pen.DCode:=Event.Code.DSetPtr
050D        Event.Pen.HorP:=25
051B        Event.Pen.VerP:=40
0529        PUT #1,Event.Pen
0536        Event.Pen.DCode:=Event.Code.DCircle
054B        Event.Pen.HorP:=8
0559        Event.Pen.VerP:=0
0567        PUT #1,Event.Pen
0574
0575
0576        (* Now we need an icon for an ellipse
059B        Event.Pen.DCode:=Event.Code.DSetPtr
05B0        Event.Pen.HorP:=25
05BE        Event.Pen.VerP:=52
05CC        PUT #1,Event.Pen
05D9        Event.Pen.DCode:=Event.Code.DEllipse
05EE        Event.Pen.HorP:=12
05FC        Event.Pen.VerP:=3
060A        PUT #1,Event.Pen
0617
0618        (* Now, an icon for a Bar
0631        Event.Pen.DCode:=Event.Code.DSetPtr
0646        Event.Pen.HorP:=14
0654        Event.Pen.VerP:=61
0662        PUT #1,Event.Pen
066F        Event.Pen.DCode:=Event.Code.DBar
0684        Event.Pen.HorP:=36
0692        Event.Pen.VerP:=67
06A0        PUT #1,Event.Pen
06AD
06AE        (* An Icon for an Arc is next
06CB        RUN gfx2("arc",25,76,7,4,-14,-8,18,14)
06F0
06F1        (* Now we'll fake a spray can
070E        RUN gfx2("box",21,86,29,93)
0725        RUN gfx2("bar",24,84,26,86)
073C        RUN gfx2("line",26,84,34,82)
0754        RUN gfx2("line",26,84,38,84)
076C        RUN gfx2("line",26,84,34,85)
0784
0785        (* We'll let the Letter 'T' be an icon
07AB        (* to represent typing text
07C6        RUN gfx2("curxy",3,12)
07D9        PRINT "T";
07DF
07E0        (* For a freehand icon, we'll use two
0806        (* crossed arcs
0815        RUN gfx2("arc",20,114,7,4,-14,-8,18,4)
083A        RUN gfx2("arc",30,110,7,4,14,8,-18,-4)
085F
0860        (* Now we'll give you five fill
087F        (* patterns to choose from
0899        (* Large Dots First
08AC        RUN gfx2("pattern",204,8)
08C1        RUN gfx2("fill",25,125)
08D3        (* Followed by horizontal lines
08F2        RUN gfx2("pattern",204,3)
0907        RUN gfx2("fill",25,135)
0919        (* Now we'll use vertical lines
0938        RUN gfx2("pattern",204,2)
094D        RUN gfx2("fill",25,146)
095F        (* and left slanted lines
0978        RUN gfx2("pattern",204,5)
098D        RUN gfx2("fill",25,156)
099F        (* and finally right slanted lines
09C1        RUN gfx2("pattern",204,6)
09D6        RUN gfx2("fill",25,172)
09E8        (* You must always return to a solid pattern
```

missing is the starting location. We'll name our new data type `orgin`. We'll name the memory location where we store it `handle`:

```
TYPE orgin=DPSCode,HanX,HanY:
INTEGER
DIM Handle:orgin
```

The data field named `DPSCode` holds the OS-9 code required to position the data pointer on your screen, `$1B40`. The fields, `HanX` and `HanY` store the starting location of our line. Let's define the starting point of a new line:

```
Handle.DPSCode:=$1B40
Handle.HanX:=0
Handle.HanY:=0
```

We can now redraw our line with two lines of code.

```
PUT #1, Handle
PUT #1, Pen
```

But that's too complicated. Why don't we design a new data type to hold the starting location, the pen and the end point of our line. Since the two lines above drew a line on the screen when we ran them, `Drawing` seemed like a natural name for our new data type. Here's what it will look like:

```
TYPE Drawing=Loc:orgin; tool:
object
```

We named the field containing the starting point `Loc` — short for location since that is what it contains. Likewise, we called the field that will hold our pen a `tool`. Think of it this way: a pen in motion — at least in the right hands — is a tool.

Now that we have defined most of the objects we'll be drawing on the screen, we need a place to store our artwork. We'll exercise a small bit of artistic license and call it a `Picture`. In your Color Computer it is really an array of drawing(s).

```
DIM Picture(100):Drawing
```

This statement will reserve 1,200 bytes of memory for a picture made up of up to 100 individual objects. Now, here's the magic. What do you think you will need to do to display your picture again? You guessed it — one line will do it:

```
PUT #1, Picture
```

Likewise, you can save that same picture in a disk file with one statement:

```
PUT #PixFile, Picture
```

Therein lies the basis for the `SavePix` and `LoadPix` modules from last month. At this point in the *KISSDraw* evolution, when you load a picture you have saved earlier, it is written into the array named `Picture` over the top of any drawings you may have already drawn during the session.

The next step will be to cause the `LoadPix` routine to add the new objects from the file after the last object is already in the picture. To do this, we will need to get one drawing at a time from the file. We can then store it as the next "drawing" in our new combined "picture" and put it on the screen. We are going to need to take this approach anyway because the data type `drawing` cannot hold all of the objects we presently create with *KISSDraw*.

We can store bars, boxes, circles, ellipses and lines. We cannot store arcs, text, our freehand drawings or a patterned fill. To store these additional objects permanently, we'll need to define a new data structure for each. Then, we'll place a flag in the `DPSCode` byte of the handle to each drawing object that cannot be completed with one of the standard tools.

If that flag is set when we get the drawing out of a picture array or a file, we'll read an additional field in `Handle` that will tell us what to do to draw the oddball object. We'll put these additional parts of the picture — objects defined with nonstandard data types —

```
0A14        (* before you try to draw again
0A33        RUN gfx2("pattern",0,0)
0A48
0A49        (* Now we'll draw a menu bar across the top of the screen
0A82        (* Initially, we'll only put a 'file' menu on it.
0AB3
0AB4        Event.Pen.DCode:=Event.Code.DSetPtr
0AC9        Event.Pen.HorP:=0
0AD7        Event.Pen.VerP:=0
0AE5        PUT #1,Event.Pen
0AF2        Event.Pen.DCode:=Event.Code.DBar
0B07        Event.Pen.HorP:=639
0B16        Event.Pen.VerP:=8
0B24        PUT #1,Event.Pen
0B31
0B32        RUN gfx2("curxy",10,0)
0B45        RUN gfx2("revon")
0B52        PRINT "File ";
0B5C        RUN gfx2("revoff")
0B6A        END
0B6C
```

**Listing 3:** `KISSDrawFill`

```
PROCEDURE KISSDrawFill
 0000       (* Procedure to fill an area of the
 0023       (* screen with a pattern selected
 0044       (* with the high resolution mouse
 0065
 0066       TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:

             INTEGER; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE

             ; X2,BDX,BDY:INTEGER; Stat,Res:BYTE; AcX,AcY,WRX,WRY:

             INTEGER
 00D7
 00D8       TYPE stats=IsEvent,InWindow,InToolBox,InMenuBar,line,box,circle

             ,ellipse,bar,arc,fill,text,freehand,RecordOn:BOOLEAN
 0117
 0118       TYPE cursor=OutPut,Scale,ScreenType,NoCur,arrow,pencil,cross

             ,hourglass,NoIcon,TextBar,Scross,Icon,IconBuff,pattern

             ,horzline,vertline,slantright,slantleft,dots:BYTE
 016B
 016C       TYPE codes=DArc,DBar,DBox,DCircle,DEllipse,DLine,DPoint,DFill

             ,DSetPtr,DPutCur,DSetCur,DLogic,DPattern:INTEGER
 01A7
 01A8       TYPE object=DCode,HorP,VerP:INTEGER
 01BB
 01BC       TYPE orgin=DPSCode,HanX,HanY
 01CD
 01CE       TYPE packet=mouse:rodent; status:stats; pointer:cursor; Code

             :codes; Pen:object; Handle:orgin
 0203
 0204       PARAM Event:packet
 020D
 020E       DIM pointers,patternset:BOOLEAN
```

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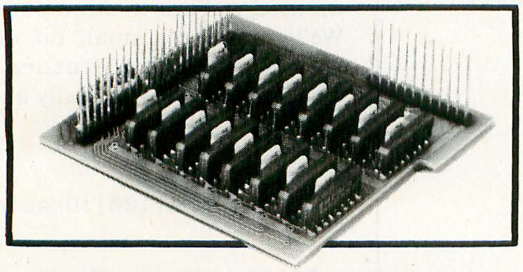

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```
0219
021A    patternset:=FALSE
0220    pointers:=FALSE
0226
0227    (* First, we must select the pattern we want to fill with
0260    (* This means we must point to it
0281
0282    WHILE NOT(patternset) DO
028C      REPEAT
028E        RUN getKISSMouse(Event)
0298        IF Event.mouse.AcX<40 THEN
02AA          pointers:=TRUE
02B0          RUN gfx2("gcset",Event.pointer.IconBuff,Event.pointer.arrow

            )
02D3        ELSE
02D7          pointers:=FALSE
02DD          RUN gfx2("gcset",Event.pointer.IconBuff,Event.pointer.NoIcon

            )
0300        ENDIF
0302      UNTIL Event.mouse.CBSA<>0 OR Event.mouse.CCtA<>0
0320
0321      IF pointers THEN
032A        IF Event.mouse.AcY>118 AND Event.mouse.AcY<130 THEN
0349          RUN gfx2("pattern",204,8) \patternset:=TRUE \REM Large Dots
0371        ELSE IF Event.mouse.AcY>130 AND Event.mouse.AcY<142 THEN


0393            RUN gfx2("pattern",204,3) \patternset:=TRUE \REM Horizontal lines
03C1          ELSE
03C5            IF Event.mouse.AcY>142 AND Event.mouse.AcY<154 THEN

03E4              RUN gfx2("pattern",204,2) \patternset:=TRUE \REM Vertical lines
0410            ELSE
0414              IF Event.mouse.AcY>154 AND Event.mouse.AcY<166 THEN

0433                RUN gfx2("pattern",204,6) \patternset:=TRUE \REM

                     Right Slanted Lines
0464              ELSE
0468                IF Event.mouse.AcY>166 THEN
047A                  RUN gfx2("pattern",204,5) \patternset:=TRUE \REM

                       Left Slanted Lines
04AA                ELSE
04AE                  RUN gfx2("pattern",0,0) \REM make sure pattern is solid
04E0                  patternset:=FALSE
04E6                ENDIF
04E8              ENDIF
04EA            ENDIF
04EC          ENDIF
04EE        ENDIF
04F0      ENDIF
04F2    ENDWHILE
04F6
04F7    (* We have the pattern now
0511    (* Let's do actual fill
0528
0529    REPEAT
052B      RUN getKISSMouse(Event)
0535
```

out to the file immediately after the main part of the picture. We should still be able to put all of our artwork in a file with one line of code. We'll just need to get it out one drawing at a time. At least that's the present theory. Hopefully, the next brick wall we run into won't be too strong.

## Other News

We have received several care packages from Steve Goldberg during the past month. Included was a slick directory sorting utility. We'll try to get some more of his work published soon.

Bob Rosen at Spectrum Projects, P.O. Box 264, Howard Beach, NY 11414, also sent several disks. He's offering a new RAM disk package for a 512K Color Computer 3. The package was written by Denny Skala, who has contributed several programs to this column during the past several years, and includes drivers for both Level I and Level II OS-9.

With Level II you can choose between device descriptors that give you 64K, 128K, 192K or 256K of RAM disk. It even includes an option that makes an attempt at recovering the information in your RAM disk after a system crash. That's handy! A Dup utility supplied with the RAM disk program is designed to replace the standard Microware/Tandy BackUp program — except the two disks do not need to be formatted identically with Rosen's package. Dup is provided to give you a quick way to transfer an entire RAM disk to a floppy disk and vice versa, regardless of the format of either. All in all, it's quite a bargain at $29.95.

Rosen also has a handy *Fastdupe* program that can format and back up your OS-9 Level II disks — up to four drives at a time — in less than five minutes. It's good to see companies like Spectrum supporting OS-9 Level II. ☐

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# OS-9 — Catch the Wave

## (But Read the Manual!)

### By Cray Augsburg
### Rainbow Technical Editor

Because of the recent emphasis on OS-9 throughout the CoCo Community, many people have decided to "get their feet wet." But this decision has often yielded soggy results.

Beginners become confused and feel quite overwhelmed by the intellectual "requirements" OS-9 places on the user. Most of these people have used Disk BASIC with their CoCos for some time and have become accustomed to the limited system control it allows. Many CoCoists have been able to sidestep these limitations and find unique ways to perform specific tasks. Others just accept what they see.

Why has the need to learn about OS-9 suddenly become a major force throughout the Community? The power and flexibility of OS-9 are often touted to non OS-9 users. Wherever you turn you hear that OS-9 is the wave of the future. People are jumping to learn all they can for fear of falling behind.

Personally, I feel OS-9 presents a very *important* option for Color Computer owners as well as users of other systems. Call it a gateway to knowledge, if you will. However, such knowledge does not come about without some struggle. We receive many calls from OS-9 newcomers that bring this point home daily.

The purpose of this article is to address some of the problems most frequently encountered by beginners in their attempts with OS-9 and to provide clarification to the new OS-9 user. Notice that I use the word "clarification." Although I understand OS-9, I realize the documentation that accompanies it sometimes seems vague and is often difficult to follow. Yet, there is no substitution for reading the manual. It bothers me to answer basic questions with, "Here is the answer, but you could have found it on Page such-and-such of the manual." Mind you, I am not saying you shouldn't ask questions. However, I sometimes feel that people try to take the easy way out. They avoid the manual and, therefore, avoid learning the process by which they can help themselves.

I am not an OS-9 "expert." I am just someone who has opened his mind to learning. In some ways, I will always consider myself a beginner. But I have surmounted each problem that has stood in my way. When I learned OS-9, I had no one to turn

```
0536        IF Event.mouse.AcX<40 OR Event.mouse.AcY<10 THEN
0555          RUN gfx2("gcset",Event.pointer.IconBuff,Event.pointer.arrow

              )
0578        ELSE
057C          RUN gfx2("gcset",Event.pointer.IconBuff,Event.pointer.Scross

              )
059F        ENDIF
05A1
05A2      UNTIL Event.mouse.CBSA<>0 AND Event.mouse.AcX>40
05C0
05C1      Event.Pen.DCode:=Event.Code.DSetPtr
05D6      Event.Pen.HorP:=Event.mouse.AcX
05EB      Event.Pen.VerP:=Event.mouse.AcY
0600      PUT #1,Event.Pen
060D      Event.Pen.DCode:=Event.Code.DFill
0622      Event.Pen.HorP:=0
0630      Event.Pen.VerP:=0
063E      PUT #1,Event.Pen
064B      REM We must always reset to solid pattern
0673      RUN gfx2("pattern",Event.pointer.NoCur,Event.pointer.NoCur)


0698      END
069A
```

**Listing 4:** `SetUpMouse`

```
PROCEDURE SetUpMouse
 0000       (* This procedure uses the program 'SysCall' to
 002F       (* do a set status call which sets up OS-9 to treat
 0062       (* the Color Computer Mouse as a high resolution device
 0099       (* using the right joystick port.  Because, this change is
 00D3       (* systemwide, another program using the mouse later would
 010D       (* also need to know how to use the optional high
 013F       (* resolution mouse adapter.
 015B
 015C       (* Since this set status call is also used to change the
 0194       (* key repeat start constant and delay speed, it tells
 01CA       (* OS-9 to leave those parameters unchanged.
 01F6
 01F7       TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
 021C
 021D       DIM regs:registers
 0226       DIM callcode:BYTE
 022D
 022E       (* Now set up the mouse parameters
 0250
 0251       regs.a:=0
 025C       regs.b:=$94
 0268       regs.x:=$0101
 0274       regs.y:=$FFFF
 0280       callcode:=$8E
 0288
 0289       RUN syscall(callcode,regs)
 0298
 0299       END
 029B
 029C
```

**Listing 5:** `WhichTool`

```
PROCEDURE WhichTool
 0000       (* Procedure to determine which tool
 0024       (* artist wants to draw with
 0040
 0041       TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:

             INTEGER; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE

             ; X2,BDX,BDY:INTEGER; Stat,Res:BYTE; AcX,AcY,WRX,WRY:

             INTEGER
 00B2
 00B3       TYPE stats=IsEvent,InWindow,InToolBox,InMenuBar,line,box,circle

             ,ellipse,bar,arc,fill,text,freehand,RecordOn:BOOLEAN
 00F2
 00F3       TYPE cursor=OutPut,Scale,ScreenType,NoCur,arrow,pencil,cross
```

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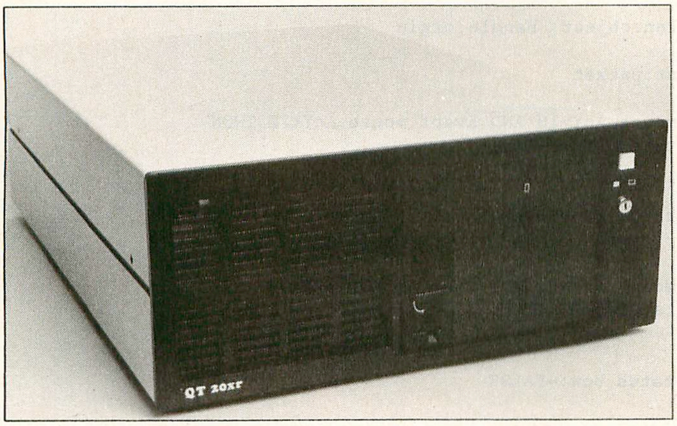

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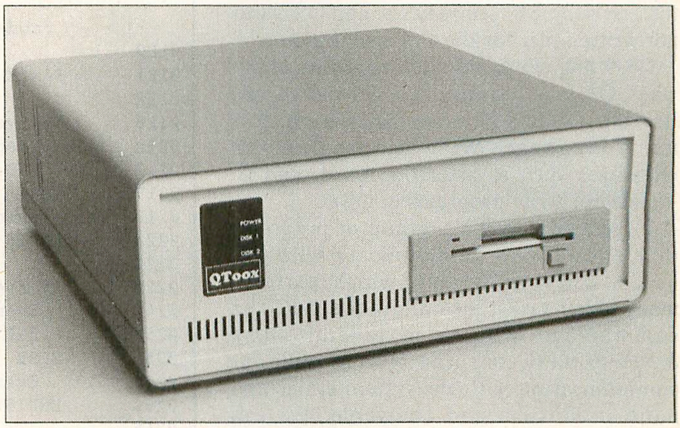

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---

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to for answers. I learned how and why OS-9 does what it does through a lot of head-scratching and, most of all, from reading the manual.

OK. I'll get off my soapbox now and look at some common problems. I'll try to cover only the pertinent aspects of OS-9 as they relate to the CoCo and the CoCo Community. Keep in mind, however, that OS-9 is available for other computer systems. It was available for some of these systems before it was available for the CoCo. We are not the first people to utilize OS-9, and OS-9 was not written just for the Color Computer.

OS-9 beginners are often confused about what OS-9 is, exactly. To set the record straight, OS-9 is an *operating system*. It is *not* a language. We write programs in languages such as assembly, BASIC and C. We do not write programs in OS-9.

In general, OS-9 is a group of programs that allow us to communicate with the CoCo. These programs, which perform many other tasks, also allow the CoCo to communicate with its peripherals (disk drives, printers, etc.) in an effort to make our communication with the system easier and more productive and enjoyable. We can write programs in many computer languages while in this OS-9 environment, and compile and execute them there. But it is important to understand that OS-9 is the *environment*, not the language or compiler.

There is still some confusion about which version/level of OS-9 works on which CoCo. OS-9 is available for the CoCo in two different levels. Level I was the first level available for the CoCo Community. It was designed to run on the CoCo 1 and CoCo 2. OS-9 Level II was designed to operate on the CoCo 3, and to take advantage of its enhanced abilities. The major differences between Level I and Level II are windows and memory management.

OS-9 Level I has limited graphics support and does not include built-in windows. Level I is also designed for a computer system containing only 64K of addressable RAM. Level II includes enhanced support for graphics. It also allows the creation of windows, which enables the user to set up several "mini-terminals," each running a different task, all on the same screen. Finally, Level II on the CoCo 3 supports 512K memory. This is accomplished via software/hardware "trickery" and is not really all that complicated. While it may be wise to have some understanding of this process, it is not something the user must constantly be aware of.

It is possible to use OS-9 Level I on the CoCo 3. However, the only version that will directly boot on the CoCo 3 is Version 2.00.00. This version of Level I is available through Radio Shack Computer Centers as an upgrade to the OS-9 package and costs $24.95. It does not offer the windowing environment and will not support anything more than 64K of RAM in your CoCo 3.

The aspect of OS-9 (levels I and II) that seems to trip up beginners most often is directory structure. OS-9 uses what is

```
          ,hourglass,NoIcon,TextBar,Scross,Icon,IconBuff,pattern

          ,horzline,vertline,slantright,slantleft,dots:BYTE
0146
0147      TYPE codes=DArc,DBar,DBox,DCircle,DEllipse,DLine,DPoint,DFill

          ,DSetPtr,DPutCur,DSetCur,DLogic,DPattern:INTEGER
0182
0183      TYPE object=DCode,HorP,VerP:INTEGER
0196
0197      TYPE orgin=DPSCode,HanX,HanY:INTEGER
01AA
01AB      TYPE packet=mouse:rodent; status:stats; pointer:cursor; Code

           :codes; Pen:object; Handle:orgin
01E0
01E1      PARAM Event:packet
01EA
01EB      IF Event.mouse.AcY>10 AND Event.mouse.AcY<22 THEN
020A        Event.status.line:=TRUE
0217        END
0219      ELSE
021D        Event.status.line:=FALSE
022A      ENDIF
022C
022D      IF Event.mouse.AcY>22 AND Event.mouse.AcY<34 THEN
024C        Event.status.box:=TRUE
0259        END
025B      ELSE
025F        Event.status.box:=FALSE
026C      ENDIF
026E
026F      IF Event.mouse.AcY>34 AND Event.mouse.AcY<46 THEN
028E        Event.status.circle:=TRUE
029B        END
029D      ELSE
02A1      ENDIF
02A3
02A4      IF Event.mouse.AcY>46 AND Event.mouse.AcY<58 THEN
02C3        Event.status.ellipse:=TRUE
02D0        END
02D2      ELSE
02D6        Event.status.ellipse:=FALSE
02E3      ENDIF
02E5
02E6      IF Event.mouse.AcY>58 AND Event.mouse.AcY<70 THEN
0305        Event.status.bar:=TRUE
0312        END
0314      ELSE
0318        Event.status.bar:=FALSE
0325      ENDIF
0327
0328      IF Event.mouse.AcY>70 AND Event.mouse.AcY<82 THEN
0347        Event.status.arc:=TRUE
0354        END
0356      ELSE
035A        Event.status.arc:=FALSE
0367      ENDIF
0369
036A      IF Event.mouse.AcY>82 AND Event.mouse.AcY<94 THEN
0389        Event.status.fill:=TRUE
0396        END
0398      ELSE
039C        Event.status.fill:=FALSE
03A9      ENDIF
03AB
03AC      IF Event.mouse.AcY>94 AND Event.mouse.AcY<106 THEN
03CB        Event.status.text:=TRUE
03D8        END
03DA      ELSE
03DE        Event.status.text:=FALSE
03EB      ENDIF
03ED
03EE      IF Event.mouse.AcY>106 AND Event.mouse.AcY<118 THEN
040D        Event.status.freehand:=TRUE
041A        END
041C      ELSE
0420        Event.status.freehand:=FALSE
042D      ENDIF
042F      END
0431
```

### **Listing 6:** DoEvent

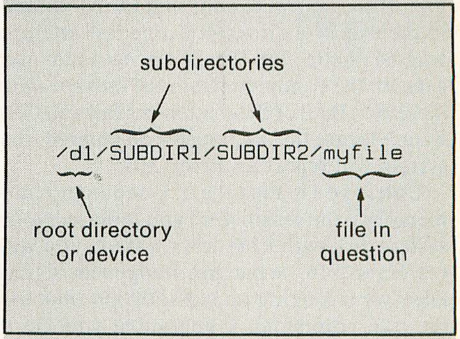
```
PROCEDURE DoEvent
 0000       (* Procedure that runs the proper tool program
 002E
 002F       TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:

             INTEGER; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE

             ; X2,BDX,BDY:INTEGER; Stat,Res:BYTE; AcX,AcY,WRX,WRY:

             INTEGER
 00A0
 00A1       TYPE stats=IsEvent,InWindow,InToolBox,InMenuBar,line,box,circle

             ,ellipse,bar,arc,fill,text,freehand,RecordOn:BOOLEAN
 00E0
 00E1       TYPE cursor=OutPut,Scale,ScreenType,NoCur,arrow,pencil,cross

             ,hourglass,NoIcon,TextBar,Scross,Icon,IconBuff,pattern

             ,horzline,vertline,slantright,slantleft,dots:BYTE
 0134
 0135       TYPE codes=DArc,DBar,DBox,DCircle,DEllipse,DLine,DPoint,DFill

             ,DSetPtr,DPutCur,DSetCur,DLogic,DPattern:INTEGER
 0170
 0171       TYPE object=DCode,HorP,VerP:INTEGER
 0184
 0185       TYPE orgin=DPSCode,HanX,HanY:INTEGER
 0198
 0199       TYPE packet=mouse:rodent; status:stats; pointer:cursor; Code

             :codes; Pen:object; Handle:orgin
 01CE
 01CF       PARAM Event:packet
 01D8
 01D9       IF Event.status.line THEN
 01E8         RUN KISSdrawLine(Event)
 01F2         Event.status.line:=FALSE
 01FF         GOTO 100
 0203       ENDIF
 0205
 0206       IF Event.status.box THEN
 0215         RUN KISSDrawbox(Event)
 021F         Event.status.box:=FALSE
 022C         GOTO 100
 0230       ENDIF
 0232
 0233       IF Event.status.circle THEN
 0242         RUN KISSDrawCircle(Event)
 024C         Event.status.circle:=FALSE
 0259         GOTO 100
 025D       ENDIF
 025F
 0260       IF Event.status.ellipse THEN
 026F         RUN KISSDrawEllipse(Event)
 0279         Event.status.ellipse:=FALSE
 0286         GOTO 100
 028A       ENDIF
 028C
 028D       IF Event.status.bar THEN
 029C         RUN KISSDrawBar(Event)
 02A6         Event.status.bar:=FALSE
 02B3         GOTO 100
 02B7       ENDIF
 02B9
 02BA       IF Event.status.arc THEN
 02C9         RUN KISSDrawArc(Event)
 02D3         Event.status.arc:=FALSE
 02E0         GOTO 100
 02E4       ENDIF
 02E6
 02E7       IF Event.status.fill THEN
 02F6         RUN KISSDrawFill(Event)
 0300         Event.status.fill:=FALSE
 030D         GOTO 100
 0311       ENDIF
 0313
```

referred to as a hierarchical directory structure. As many of you are aware, this type of structure resembles a tree that has been turned upside down. The root (main directory) is at the top and the many branches (subdirectories and files) are below it.

Aside from the use of shortcuts, which will take a little time to learn, you must use what is called a pathlist to access any given file in the structure. A full pathlist indicates the device on which the file is located. In most cases, this means, "What drive holds the disk on which the file resides?" The answer to this will usually be /d0 or /d1. Following the device will be a complete list of all directories you must go through in order to reach the file. Finally, the pathlist includes the name of the actual file.

One way to visualize the pathlist in terms of the tree is to imagine yourself "climbing" the upside-down tree from *top to bottom*. You start at the root (in nearly every case, the root directory is the same as the device) and include every branch you must grab onto in order to reach the file in question. All of the directory names and filenames in the pathlist must be separated with slashes. Also, the pathlist cannot contain any spaces. If it does, OS-9 will interpret the pathlist incorrectly and the attempt will result in an error.

I am not going to give an example of the hierarchical directory structure concept. I feel the manual contains more than enough examples. I will give you an example of a generic pathlist and point out its major components, though.



One of the most difficult things for experienced users of Disk BASIC to get used to is that entering `dir` under OS-9 yields only the files and subdirectories in the current directory, and not a listing of the entire disk. Each of the subdirectories within your current directory may contain several files. So, what you are really seeing when you enter `dir` may be only the tip of the iceberg as far as seeing the number of files that actually reside on the disk.

To find out what files are in a subdirectory of your current directory, you can simply type `dir`, followed by a space, followed by a pathlist which ends in the name of the subdirectory in question. Note that you must include a space between a command and a pathlist. In the above example, we could get a directory of the contents of the subdirectory SUBDIR2 by entering:

```
dir /d1/SUBDIR1/SUBDIR2
```

Let's assume you have OS-9 up and running and you want to see what's in the SOURCE subdirectory on this month's RAINBOW ON DISK. You pull the OS-9 System Master backup out of Drive 0, pop in RAINBOW ON DISK and enter `dir /d0/SOURCE`. After a few seconds of drive sounds you are greeted with the ever-present Error 216. You run to the manual and discover that Error 216 (get used to it because you'll be seeing quite a few of these) translates to "Pathname not found." You immediately say, "But I typed in the correct pathlist!" Then you assume RAINBOW must somehow have forgotten to put the SOURCE subdirectory on the disk.

What the error message is really telling you is one of two things: 1) OS-9 couldn't *find the* `dir` command; or 2) OS-9 couldn't find any one of the components in the pathlist. Either of these possibilities could be caused by a typographical error. They could also be caused by one of the items (command or pathlist component) not actually being there.

I will venture a wild guess. If your typing was absolutely correct, and all spaces and slashes were included, chances are OS-9 couldn't find the original command — in this case, `dir`. Chances are pretty good that you are using OS-9 Level I, as well. Before OS-9 can execute a command, it looks to see if that command has been loaded into memory. If OS-9 can locate the command in memory, it will be executed. If the command isn't in memory, OS-9 will try to load it and execute it from the *current execution directory.* If the system cannot find the command in the execution directory, one last attempt will be made. OS-9 will try to load and execute the command from the *current data directory.* If all of these attempts fail and OS-9 can't locate the command you entered, the system will report an Error 216.

Unless you loaded the `dir` command into memory from disk before you replaced your system disk with RAINBOW ON DISK, you will get Error 216. What has happened is that OS-9 went looking on RAINBOW ON DISK for the `dir` command. I guarantee you OS-9 won't ever find it there. Level II users won't have this problem with the `dir` command, since Level II loads several commands into memory when you first boot it. However, keep this in mind, as it can occur with any command.

That's all I have room for this month, but I want to leave you with a few challenges before I go. Learn all you can about OS-9's directory structure, what the `chd` and `chx` commands are for, and discover how to use the two commands to your advantage. You might want to look into what is meant by current execution directory and current data directory. Discover the differences between them. If you take the time and learn to learn, you will quickly go beyond all those nasty errors and begin to see the true power of the system. And you can say you taught yourself.

```
0314        IF Event.status.text THEN
0323          RUN KISSHandleText(Event)
032D          Event.status.text:=FALSE
033A          GOTO 100
033E        ENDIF
0340
0341        IF Event.status.freehand THEN
0350          RUN KISSFreehand(Event)
035A          Event.status.freehand:=FALSE
0367        ENDIF
0369
036A 100    Event.status.IsEvent:=FALSE
037A        Event.status.InToolBox:=FALSE
0387        Event.status.InMenuBar:=FALSE
0394        END
0396
0397
```

**Listing 7:** `KISSDrawBox`

```
PROCEDURE KISSDrawBox
 0000       (* Program to draw a box at location pointed
 002C       (* to by high resolution mouse.
 004B
 004C      TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:
            INTEGER; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE
            ; X2,BDX,BDY:INTEGER; Stat,Res:BYTE; AcX,AcY,WRX,WRY:
            INTEGER
 00BD
 00BE       TYPE stats=IsEvent,InWindow,InToolBox,InMenuBar,line,box,circle
             ,ellipse,bar,arc,fill,text,freehand,RecordOn:BOOLEAN
 00FD
 00FE       TYPE cursor=OutPut,Scale,ScreenType,NoCur,arrow,pencil,cross
             ,hourglass,NoIcon,TextBar,Scross,Icon,IconBuff,pattern
             ,horzline,vertline,slantright,slantleft,dots:BYTE
 0151
 0152       TYPE codes=DArc,DBar,DBox,DCircle,DEllipse,DLine,DPoint,DFill
             ,DSetPtr,DPutCur,DSetCur,DLogic,DPattern:INTEGER
 018D
 018E       TYPE object=DCode,HorP,VerP:INTEGER
 01A1
 01A2       TYPE orgin=DPSCode,HanX,HanY:INTEGER
 01B5
 01B6       TYPE packet=mouse:rodent; status:stats; pointer:cursor; Code
             :codes; Pen:object; Handle:orgin
 01EB
 01EC       PARAM Event:packet
 01F5
 01F6       DIM StartX,StartY,CurrX,CurrY:INTEGER
 0209
 020A       (* Enable XOR logic
 021E
 021F       RUN gfx2("logic","xor")
 0232
 0233       REPEAT
 0235         RUN getKISSmouse(Event)
 023F       UNTIL Event.mouse.CBSA<>0 AND Event.mouse.AcX>40
 025D
 025E       StartX:=Event.mouse.BDX
 026C       StartY:=Event.mouse.BDY
 027A       CurrX:=StartX
 0282       CurrY:=StartY
 028A
 028B       Event.Handle.HanX:=StartX
 029A       Event.Handle.HanY:=StartY
 02A9       PUT #1,Event.Handle
 02B6
 02B7       WHILE Event.mouse.CBSA<>0 DO
 02C9         RUN getKISSmouse(Event)
 02D3         Event.Pen.DCode:=Event.Code.DBox
 02E8         IF CurrX<>Event.mouse.AcX OR CurrY<>Event.mouse.AcY THEN
 0309
```

```
030A          REM If box has changed erase the old one by drawing over it
0344          Event.Pen.HorP:=CurrX \Event.Pen.VerP:=CurrY
0362          PUT #1,Event.Pen
036F
0370          REM Save location of new box
038B          CurrX:=Event.mouse.AcX
0399          CurrY:=Event.mouse.AcY
03A7
03A8          REM And put it on the screen
03C4          Event.Pen.HorP:=CurrX \Event.Pen.VerP:=CurrY
03E2          PUT #1,Event.Pen
03EF        ENDIF
03F1      ENDWHILE
03F5
03F6      RUN gfx2("logic","off")
0409      PUT #1,Event.Pen
0416      END
0418
0419
```

**Listing 8:** KISSDrawLine

```
PROCEDURE KISSdrawline
 0000     (* Program to draw a line at location pointed
 002D     (* to by high resolution mouse.
 004C
 004D     TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:
           INTEGER; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE
           ; X2,BDX,BDY:INTEGER; Stat,Res:BYTE; AcX,AcY,WRX,WRY:
           INTEGER
 00BE
 00BF     TYPE stats=IsEvent,InWindow,InToolBox,InMenuBar,line,box,circle
           ,ellipse,bar,arc,fill,text,freehand,RecordOn:BOOLEAN
 00FE
 00FF     TYPE cursor=OutPut,Scale,ScreenType,NoCur,arrow,pencil,cross
           ,hourglass,NoIcon,TextBar,Scross,Icon,IconBuff,pattern
           ,horzline,vertline,slantright,slantleft,dots:BYTE
 0152
 0153     TYPE codes=DArc,DBar,DBox,DCircle,DEllipse,DLine,DPoint,DFill
           ,DSetPtr,DPutCur,DSetCur,DLogic,DPattern:INTEGER
 018E
 018F     TYPE object=DCode,HorP,VerP:INTEGER
 01A2
 01A3     TYPE orgin=DPSCode,HanX,HanY:INTEGER
 01B6
 01B7     TYPE packet=mouse:rodent; status:stats; pointer:cursor; Code
           :codes; Pen:object; Handle:orgin
 01EC
 01ED     PARAM Event:packet
 01F6
 01F7     DIM StartX,StartY,CurrX,CurrY:INTEGER
 020A
 020B     RUN gfx2("logic","xor")
 021E
 021F     REPEAT
 0221       RUN getKISSmouse(Event)
 022B     UNTIL Event.mouse.CBSA<>0 AND Event.mouse.AcX>40
 0249
 024A     Event.Handle.HanX:=Event.mouse.BDX
 025F     Event.Handle.HanY:=Event.mouse.BDY
 0274     PUT #1,Event.Handle
 0281
 0282     CurrX:=Event.mouse.AcX
 0290     CurrY:=Event.mouse.AcY
 029E
 029F     WHILE Event.mouse.CBSA<>0 DO
 02B1       RUN getKISSmouse(Event)
 02BB       Event.Pen.DCode:=Event.Code.DLine
 02D0       IF CurrX<>Event.mouse.AcX OR CurrY<>Event.mouse.AcY THEN
 02F1
```

*Modification . . .*

## *Solitaire* Upgrade — Automatic Finish

**By Tudor Jones**

In reference to "The Solitary Endeavor" (December 1986, Page 76), please find a revision to Line 280 of the program listing, and additional lines 282, 285 and 288, and 1260 to 1390.

```
280 IF DECK(1)>0THEN288
282 N=0:FORI=40TO262STEP37:IF PP
OINT(I,43)=0THEN I=262:N=1
285 NEXT:IF N=0THEN1260
288 XC=165:YC=1:GOSUB130:IF STAC
K(1)+STACK(2)+STACK(3)+STACK(4)=
52THEN300ELSE XC=166:YC=15:GOSUB
110
```

```
1260 XC=165:YC=0:GOSUB130:FORF=1
TO7:I=20
1270 IF COL(F,I)=0THEN I=I-1 ELS
E P(F)=I:GOTO1290
1280 IF I>0THEN1270
1290 NEXT
1300 IF STACK(1)+STACK(2)+STACK(
3)+STACK(4)=52THEN300
1310 IF INKEY$="Q"THEN10
1320 FOR F=1TO7:I=P(F):IF I=0THE
N1390
1330 CARD=COL(F,I):N=CARD:GOSUB7
0:IF RANK<>STACK(SUIT)+1THEN1390
1340 XC=F*37-36:YC=YC(F):GOSUB13
0
1350 COL(F,I)=0:IF YC(F)>45THEN
YC(F)=YC(F)-9
1360 IF COL(F,I)=0THEN YC=45:GOS
UB130:GOTO1380
1370 CARD=COL(F,I-1):GOSUB70:YC=
YC(F):GOSUB140:P(F)=P(F)-1
1380 CARD=N:GOSUB70:STACK(SUIT)=
STACK(SUIT)+1:XC=SUIT*38-24:YC=0
:GOSUB130:GOSUB140
1390 NEXT:GOTO1300
```

When all the cards at the top of columns 2 to 7 have been exposed, and no cards remain in the deck, this added routine automatically scans all seven columns in turn, moving the eligible cards to the top stacks until all the columns are empty.

Be careful when typing in these extra lines. After all, you are not going to get too many chances to correct them! Also, do not renumber the program after keying in these additions.

Many thanks to Mr. Vincent Johnson, of St. Paul, Minnesota, for suggesting this enhancement.

## Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful/helpful/fun for other CoCo owners.

**WHAT TO WRITE:** We are interested in what you may wish to tell our readers. We accept for consideration anything that is well-written and has a practical application for the Tandy Color Computer. If it interests you, it will probably interest lots of others. However, we vastly prefer articles with accompanying programs which can be entered and run. The more unique the idea, the more the appeal. We have a continuing need for short articles with short listings. These are especially appealing to our many beginners.

**FORMAT:** Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included on the tape or disk using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

**COMPENSATION:** We do pay for submissions, based on a number of criteria. Those wishing renumeration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submission Guidelines, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

Please do not submit material currently submitted to another publication.

```
02F2          REM Erase old line by drawing over it
0316          Event.Pen.HorP:=CurrX \Event.Pen.VerP:=CurrY
0334          PUT #1,Event.Pen
0341
0342          REM Save position of current line
0362          CurrX:=Event.mouse.AcX \CurrY:=Event.mouse.AcY
037E
037F          REM And, draw line in new position
03A0          Event.Pen.HorP:=CurrX \Event.Pen.VerP:=CurrY
03BE          PUT #1,Event.Pen
03CB        ENDIF
03CD      ENDWHILE
03D1      RUN gfx2("logic","off")
03E4      PUT #1,Event.Pen
03F1      END
```

**Listing 9:** `KISSDrawCircle`

```
PROCEDURE KISSDrawCircle
 0000     (* Program to draw a circle at location pointed
 002F     (* to by high resolution mouse.
 004E
 004F     TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:

           INTEGER; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE

           ; X2,BDX,BDY:INTEGER; Stat,Res:BYTE; AcX,AcY,WRX,WRY:

           INTEGER
 00C0
 00C1     TYPE stats=IsEvent,InWindow,InToolBox,InMenuBar,line,box,circle

           ,ellipse,bar,arc,fill,text,freehand,RecordOn:BOOLEAN
 0100
 0101     TYPE cursor=OutPut,Scale,ScreenType,NoCur,arrow,pencil,cross

           ,hourglass,NoIcon,TextBar,Scross,Icon,IconBuff,pattern

           ,horzline,vertline,slantright,slantleft,dots:BYTE
 0154
 0155     TYPE codes=DArc,DBar,DBox,DCircle,DEllipse,DLine,DPoint,DFill

           ,DSetPtr,DPutCur,DSetCur,DLogic,DPattern:INTEGER
 0190
 0191     TYPE object=DCode,HorP,VerP:INTEGER
 01A4
 01A5     TYPE orgin=DPSCode,HanX,HanY:INTEGER
 01B8
 01B9     TYPE packet=mouse:rodent; status:stats; pointer:cursor; Code

           :codes; Pen:object; Handle:orgin
 01EE
 01EF     PARAM Event:packet
 01F8
 01F9     DIM StartX,StartY,CurrX,CurrY:INTEGER
 020C
 020D     (* Enable XOR logic, then
 0226     (* let cursor follow mouse until button is pushed
 0257
 0258     RUN gfx2("logic","xor")
 026B
 026C     REPEAT
 026E       RUN getKISSmouse(Event)
 0278     UNTIL Event.mouse.CBSA<>0 AND Event.mouse.AcX>40
 0296
 0297     StartX:=Event.mouse.BDX
 02A5     StartY:=Event.mouse.BDY
 02B3     CurrX:=Event.mouse.AcX
 02C1     CurrY:=Event.mouse.AcY
 02CF
 02D0     REM Create Handle and Set Data Pointer at mouse position
 0307     Event.Handle.HanX:=StartX \Event.Handle.HanY:=StartY
 0325     PUT #1,Event.Handle
 0332
 0333     WHILE Event.mouse.CBSA<>0 DO
 0345       RUN getKISSmouse(Event)
 034F       Event.Pen.DCode:=Event.Code.DCircle
 0364       Event.Pen.VerP:=0
```

```
0372        IF CurrX<>Event.mouse.AcX OR CurrY<>Event.mouse.AcY THEN
0393
0394          REM Erase previous circle by drawing over it
03BF          Event.Pen.HorP:=ABS(CurrX-StartX)
03D3          PUT #1,Event.Pen
03E0
03E1          REM save current circle position
0400          CurrX:=Event.mouse.AcX
040E          CurrY:=Event.mouse.AcY
041C
041D          REM draw new circle
042F          Event.Pen.HorP:=ABS(CurrX-StartX)
0443          PUT #1,Event.Pen
0450        ENDIF
0452      ENDWHILE
0456
0457      RUN gfx2("logic","off")
046A      Event.Pen.HorP:=ABS(CurrX-StartX)
047E      PUT #1,Event.Pen
048B      END
```

**Listing 10:** `KISSDrawEllipse`

```
PROCEDURE KISSDrawEllipse
 0000     (* Program which allows more natural drawing of ellipse
 0037
 0038     TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:
           INTEGER; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE
           ; X2,BDX,BDY:INTEGER; Stat,Res:BYTE; AcX,AcY,WRX,WRY:
           INTEGER
 00A9
 00AA     TYPE stats=IsEvent,InWindow,InToolBox,InMenuBar,line,box,circle
           ,ellipse,bar,arc,fill,text,freehand,RecordOn:BOOLEAN
 00E9
 00EA     TYPE cursor=OutPut,Scale,ScreenType,NoCur,arrow,pencil,cross
           ,hourglass,NoIcon,TextBar,Scross,Icon,IconBuff,pattern
           ,horzline,vertline,slantright,slantleft,dots:BYTE
 013D
 013E     TYPE codes=DArc,DBar,DBox,DCircle,DEllipse,DLine,DPoint,DFill
           ,DSetPtr,DPutCur,DSetCur,DLogic,DPattern:INTEGER
 0179
 017A     TYPE object=DCode,HorP,VerP:INTEGER
 018D
 018E     TYPE orgin=DPSCode,HanX,HanY:INTEGER
 01A1
 01A2     TYPE packet=mouse:rodent; status:stats; pointer:cursor; Code
           :codes; Pen:object; Handle:orgin
 01D7
 01D8     PARAM Event:packet
 01E1
 01E2     DIM StartX,StartY,CurrX,CurrY:INTEGER
 01F5
 01F6     (* Enable XOR logic, then
 020F     (* let cursor follow mouse until button is pushed
 0240
 0241     RUN gfx2("logic","xor")
 0254
 0255     REPEAT
 0257       RUN getKISSmouse(Event)
 0261     UNTIL Event.mouse.CBSA<>0 AND Event.mouse.AcX>40
 027F
 0280     StartX:=Event.mouse.BDX
 028E     StartY:=Event.mouse.BDY
 029C     CurrX:=StartX
 02A4     CurrY:=StartY
 02AC
 02AD     REM Create Handle and set data pointer position
 02DB     Event.Handle.HanX:=StartX
 02EA     Event.Handle.HanY:=StartY
 02F9     PUT #1,Event.Handle
 0306
```

## About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

*Here are the guidelines:* The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry (preferably on cassette or disk) to:

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**Prospect, KY 40059**

# Simple Solutions

## By David W. Ostler

Here is a possible answer to the exercise presented in "Basic for Beginners, Lesson II" on Page 36.

**The listing:** SOLUTION

```
10 CLS:SOUND200,2:PRINT:PRINT"EN
TER YOUR NAME:  ":INPUTA$
15 SOUND200,2:PRINT"ENTER YOUR A
DDRESS:":INPUTB$
20 SOUND200,2:PRINT"ENTER YOUR C
ITY":INPUTC1$
25 SOUND200,2:PRINT"ENTER YOUR S
TATE:":INPUTC2$
30 SOUND200,2:PRINT"ENTER YOUR Z
IP:":INPUTC3$
40 SOUND200,2:PRINT"ENTER YOUR T
ELEPHONE NUMBER:":INPUTD$
50 CLS4:PRINT@230,"WORKING..";
55 SOUND200,2:PRINT@239,"..";:SO
UND100,5:PRINT@241,"..";:SOUND20
0,2:SOUND100,5:PRINT@243,"..";:S
OUND200,2:PRINT@245,"..";:SOUND1
00,5:PRINT@247,"..";:SOUND200,2:
PRINT@249,"..";:SOUND100,5
60 FORX=1TO500STEP1:NEXT
70 CLS:PRINT:PRINT"1. YOUR NAME:
":PRINT"   ";A$:PRINT"2. YOUR AD
DRESS:":PRINT"   ";B$:PRINT"3. Y
OUR CITY, ST, ZIP:":PRINT"   ";C
1$;", ";C2$;", ";C3$:PRINT"4. YO
U PH. NO:":PRINT"   ";D$
90 PRINT:PRINT" IS ALL DATA CORR
ECT (Y/N)?"
100 H$=INKEY$:IFH$=""THEN100ELSE
IFH$="Y"THEN110ELSEIFH$="N"THEN1
0ELSE100
110 CLS:PRINT:PRINT"      CHOOSE
YOUR SELECTON"
120 PRINT:PRINT:PRINT:PRINT" 1.
YOUR NAME:":PRINT" 2. YOUR ADDRE
SS:":PRINT" 3. YOUR CITY, ST, ZI
P:":PRINT" 4. YOU PH. NO:":PRINT
" 5. ABORT THIS PROGRAM":PRINT@4
26,"[1/2/3/4/5]"
130 H$=INKEY$:IFH$=""THEN130ELSE
IFH$="1"THEN140ELSEIFH$="2"THEN1
50ELSEIFH$="3"THEN160ELSEIFH$="4
"THEN170ELSEIFH$="5"THEN180ELSE1
30
140 CLS:PRINT:PRINTA$
143 GOSUB500
145 GOTO110
150 CLS:PRINT:PRINTB$
153 GOSUB500
155 GOTO110
160 CLS:PRINT:PRINTC1$;", ";C2$;
", ";C3$
163 GOSUB500
165 GOTO110
170 CLS:PRINT:PRINTD$
173 GOSUB500
175 GOTO110
180 CLS3:PRINT@230,"REBOOTING TO
 BASIC";:SOUND200,2:SOUND100,5:S
OUND200,2:SOUND100,5:SOUND200,2:
SOUND100,5:SOUND200,2:SOUND100,5
:FORX=1TO500STEP1:NEXTX:CLS:END
500 PRINT@420,"PRESS ANY KEY TO
CONTINUE"
510 H$=INKEY$:IFH$=""THEN510
520 RETURN
```

```
0307       WHILE Event.mouse.CBSA<>0 DO
0319         RUN getKISSmouse(Event)
0323         Event.Pen.DCode:=Event.Code.DEllipse
0338         IF CurrX<>Event.mouse.AcX OR CurrY<>Event.mouse.AcY THEN

0359           Event.Pen.HorP:=ABS(CurrX-StartX) \Event.Pen.VerP:=ABS(

                CurrY-StartY)
0381           PUT #1,Event.Pen
038E           CurrX:=Event.mouse.AcX
039C           CurrY:=Event.mouse.AcY
03AA           Event.Pen.HorP:=ABS(CurrX-StartX) \Event.Pen.VerP:=ABS(

                CurrY-StartY)
03D2           PUT #1,Event.Pen
03DF         ENDIF
03E1       ENDWHILE
03E5       RUN gfx2("logic","off")
03F8       Event.Pen.HorP:=ABS(CurrX-StartX) \Event.Pen.VerP:=ABS(CurrY

            -StartY)
0420       PUT #1,Event.Pen
042D       END
042F
```

**Listing 11:** KISSDrawBar

```
PROCEDURE KISSdrawbar
0000       (* Program to draw a bar at location pointed
002C       (* to by high resolution mouse.
004B
004C       TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:

            INTEGER; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE

            ; X2,BDX,BDY:INTEGER; Stat,Res:BYTE; AcX,AcY,WRX,WRY:

            INTEGER
00BD
00BE       TYPE stats=IsEvent,InWindow,InToolBox,InMenuBar,line,box,circle

            ,ellipse,bar,arc,fill,text,freehand,RecordOn:BOOLEAN
00FD
00FE       TYPE cursor=OutPut,Scale,ScreenType,NoCur,arrow,pencil,cross

            ,hourglass,NoIcon,TextBar,Scross,Icon,IconBuff,pattern

            ,horzline,vertline,slantright,slantleft,dots:BYTE
0151
0152       TYPE codes=DArc,DBar,DBox,DCircle,DEllipse,DLine,DPoint,DFill

            ,DSetPtr,DPutCur,DSetCur,DLogic,DPattern:INTEGER
018D
018E       TYPE object=DCode,HorP,VerP:INTEGER
01A1
01A2       TYPE orgin=DPSCode,HanX,HanY:INTEGER
01B5
01B6       TYPE packet=mouse:rodent; status:stats; pointer:cursor; Code

            :codes; Pen:object; Handle:orgin
01EB
01EC       PARAM Event:packet
01F5
01F6       DIM StartX,StartY,CurrX,CurrY:INTEGER
0209
020A       (* Enable XOR logic
021E
021F       RUN gfx2("logic","xor")
0232
0233       REPEAT
0235         RUN getKISSmouse(Event)
023F       UNTIL Event.mouse.CBSA<>0 AND Event.mouse.AcX>40
025D
025E       StartX:=Event.mouse.BDX
026C       StartY:=Event.mouse.BDY
027A       CurrX:=StartX
0282       CurrY:=StartY
028A
028B       Event.Handle.HanX:=StartX
```

```
029A      Event.Handle.HanY:=StartY
02A9      PUT #1,Event.Handle
02B6
02B7      WHILE Event.mouse.CBSA<>0 DO
02C9        RUN getKISSmouse(Event)
02D3        Event.Pen.DCode:=Event.Code.DBox
02E8        Event.Pen.HorP:=CurrX \Event.Pen.VerP:=CurrY
0306        PUT #1,Event.Pen
0313
0314        CurrX:=Event.mouse.AcX \CurrY:=Event.mouse.AcY
0330        Event.Pen.HorP:=CurrX \Event.Pen.VerP:=CurrY
034E        PUT #1,Event.Pen
035B      ENDWHILE
035F
0360      RUN gfx2("logic","off")
0373      Event.Pen.DCode:=Event.Code.DBar
0388      PUT #1,Event.Pen
0395      END
0397
```

**Listing 12:** `KISSFreehand`

```
PROCEDURE KISSfreehand
 0000     (* Program to draw freehand with high resolution mouse
 0036
 0037     TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTTo:BYTE; TSSt:

           INTEGER; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLSA,TLSB:BYTE

           ; X2,BDX,BDY:INTEGER; Stat,Res:BYTE; AcX,AcY,WRX,WRY:

           INTEGER
 00A8
 00A9     TYPE stats=IsEvent,InWindow,InToolBox,InMenuBar,line,box,circle

           ,ellipse,bar,arc,fill,text,freehand,RecordOn:BOOLEAN
 00E8
 00E9     TYPE cursor=OutPut,Scale,ScreenType,NoCur,arrow,pencil,cross

           ,hourglass,NoIcon,TextBar,Scross,Icon,IconBuff,pattern

           ,horzline,vertline,slantright,slantleft,dots:BYTE
 013C
 013D     TYPE codes=DArc,DBar,DBox,DCircle,DEllipse,DLine,DPoint,DFill

           ,DSetPtr,DPutCur,DSetCur,DLogic,DPattern:INTEGER
 0178
 0179     TYPE object=DCode,HorP,VerP:INTEGER
 018C
 018D     TYPE orgin=DPSCode,HanX,HanY:INTEGER
 01A0
 01A1     TYPE packet=mouse:rodent; status:stats; pointer:cursor; Code

           :codes; Pen:object; Handle:orgin
 01D6
 01D7     PARAM Event:packet
 01E0
 01E1     DIM StartX,StartY,DLineM:INTEGER
 01F0     DLineM:=$1B46
 01F8
 01F9     REPEAT
 01FB       RUN getKISSMouse(Event)
 0205     UNTIL Event.mouse.CBSA<>0 AND Event.mouse.AcX>40
 0223
 0224     Event.Handle.HanX:=Event.mouse.AcX
 0239     Event.Handle.HanY:=Event.mouse.AcY
 024E     PUT #1,Event.Handle
 025B
 025C     WHILE Event.mouse.CBSA<>0 DO
 026E       RUN getKISSMouse(Event)
 0278       Event.Pen.DCode:=DLineM
 0287       Event.Pen.HorP:=Event.mouse.AcX \Event.Pen.VerP:=Event.mouse.AcY
 02B1       PUT #1,Event.Pen
 02BE     ENDWHILE
 02C2
 02C3     END
 02C5
 02C6
```

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## OS-9 Programming

# Polishing off the Screen Save/Dump Package

### By Peter Dibble

The RLSqsh filter that was in my last article needs a mate, and the GetImage BASIC09 program from several months ago now takes more than twice as long as the latest SaveImage. We'll tackle the RLExpnd (Run Length Expand) filter and the GetImage speed enhancement the same way we did RLSqsh and SaveImage.

The improved GetImage takes less than a minute (compared to over three minutes for the old version), and it was easy to write. Everything in it is derived from something else.

The GetImage and PutBuffer BASIC09 procedures are taken directly from the original program. The unpress BASIC09 procedure was derived from the original unpress procedure mostly by removing code. I removed about a page of code and added six or seven lines.

MakPipe2 is a revised version of MakPipe. SaveImage piped data to RLSqsh and directed the output of RLSqsh to a file. GetImage directs the input of RLExpnd to a file and the output to a pipe. Most of the changes between MakPipe and MakPipe2 were to the comments, but it's important to pay close attention. I got the procedure wrong the first time and left the paths backwards.

I kept most of the buffer management code from RLSqsh when I converted it to RLExpnd, but I threw out almost everything else. Even in the buffer management I made a change. I assumed that RLSqsh would deal more with input than output, so I used the X register as a pointer into the input buffer. RLExpnd should do more output than input, so I used memory for the input pointer and used X for the output pointer.

After you have all the code for GetImage in your machine (four BASIC09 procedures and the RLExpnd module from your assembler or the CSave file) you can restore a file saved by SaveImage by running GetImage and giving it the name of the file SaveImage created. It will paint the new image on the screen in four sections starting at the top of the screen.

I've frequently tried to run GetImage or SaveImage on a text screen, but it doesn't work, and the program is a bit hostile about it. If you get an error right after you start running one of these programs, make sure that the current screen is a graphics window.

You can amuse yourself and burn CPU time by piping the output of RLSqsh to RLExpnd. It is a way to verify that the filters are working; if they are, RLSqsh ! RLExpnd does nothing but work hard.

**What Have We Learned?**

I didn't make a big fuss about it, but it is much more difficult to write correct assembly language than it is to write correct BASIC09. If the code isn't correct, it's *much* easier to find problems in BASIC09 procedures using the BASIC09 debugging environment than it is debugging assembly language code. C programs fall between BASIC09 and assembly language in difficulty.

Most of a program is not executed often enough for its speed to matter. It is best to write the whole program in your favorite language and debug it well. If it is not fast enough, improve the program without changing languages. If nothing else works, take some important parts of the program and code them in assembly language.

But sometimes it does not make sense to write any part of a program in assembly: If the program is small enough and fast enough in BASIC09 or C, leave it alone!

When you decide to resort to assembly, make it pay. RLSqsh and RLExpnd would be a little faster if they were subroutine modules instead of filters, but as filters they have more possible uses. The more possible uses a program has, the better I feel about working hard on it.

All this talk about assembly language being a last resort might make you wonder, since I usually sound like I am

---

*Peter Dibble has a bachelor's degree in chemistry and is currently a graduate student in computer science. He has worked as an applications programmer, systems programmer and as the user services assistant director for the University of Rochester Computing Center. With Dale Puckett, he is co-author of* The Complete Rainbow Guide to OS-9 *and the first volume of* The Complete Rainbow Guide to OS-9 Level II.

especially fond of assembly. I am, but I've noticed something about my assembly language programs — they are small and fast, but not always as elaborate as they might be. I sometimes leave out error recovery routines or use hexadecimal numbers instead of decimal. I get excited about the parts where assembly language makes a big difference and go lightly when the extra work that assembly language requires doesn't pay. When I start with a high-level language program and recode only the most interesting parts, I can concentrate on the sections where speed counts. ☐

> ***"If the program is small enough and fast enough in BASIC09 or C, leave it alone!"***

**Listing 1:** `RLExpnd.CDump`

```
 1: 87CD 00B7 000D 1181 9F00  134490.
 2: 1508 D152 4C45 7870 6EE4  50192.
 3: 010F 0030 499F 059F 0330  13034.
 4: C904 090F 070F 088D 2225  107245.
 5: 0E1F 8954 5454 5484 0F97  43429.
 6: 028D 0820 EE8D 625F 103F  51323.
 7: 0696 028D 335A 2AF9 3943  55337.
 8: 103F 0634 109E 059C 0326  32164.
 9: 1486 0010 8E04 0030 4910  50530.
10: 3F89 250E 1F20 318B 109F  75603.
11: 034F A680 9F05 3590 3510  57490.
12: C1D3 26D3 4339 0D00 2609  174445.
13: 4848 4848 9701 0300 399A  74260.
14: 018D 0303 0039 109E 0710  38886.
15: 8C04 0026 028D 0BA7 8031  78517.
16: 2110 9F07 3910 9E07 3402  45270.
17: 30C9 0409 8601 103F 8A25  82117.
18: 9A10 8E00 0010 9F07 3582  102912.
19: 3684 46                   550.
```

**Listing 2:** `GetImage`

```
PROCEDURE GetImage
 0000         DIM FileName:STRING[99]
 000C         INPUT "Image file name: ",FileName
 0025         RUN unpress(FileName)
 002F         END
```

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**Listing 3:** UnPress

```
PROCEDURE unpress
 0000       PARAM FileName:STRING[99]
 000C       DIM Path,Pipe:BYTE
 0017       DIM buffer(7680):BYTE
 0023       DIM section:INTEGER
 002A       DIM WinType,horiz,vert:INTEGER
 0039
 003A       OPEN #Path,FileName:READ
 0046       section:=1
 004D       GET #Path,WinType
 0057       GET #Path,horiz
 0061       GET #Path,vert
 006B       RUN MakPipe2("RLExpnd",Pipe,Path)
 0084       ON ERROR GOTO 100
 008A       LOOP
 008C         GET #Pipe,buffer
 0096         RUN PutBuffer(buffer,section,WinType,horiz,vert/4)
 00B6         section:=section+1
 00C1       ENDLOOP
 00C5 100   REM end loop (probably end of file)
 00EA       CLOSE #Path,#Pipe
 00F5       END
```

**Listing 4:** PutBuffer

```
PROCEDURE PutBuffer
 0000       PARAM buffer(7680):BYTE
 000C       PARAM section:INTEGER
 0013       PARAM typecode:INTEGER
 001A       PARAM horiz,vert:INTEGER
 0025       TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
 004A       DIM regs:registers
 0053       DIM i,group:INTEGER
 005E
 005F       REM Get this process's process id
 007F       RUN syscall($0C,regs)
 008D       group:=regs.a
 0098       ON ERROR GOTO 100
 009E       RUN gfx2("defbuff",group,1,7680)
 00B9 100   REM The buffer is now defined
 00D8       RUN gfx2("gpload",group,1,typecode,horiz-1,vert,7680)
 0103       PUT #1,buffer
 010C       RUN gfx2("put",group,1,0,vert*(section-1))
 012D       RUN gfx2("killbuff",group,1)
 0145       END
```

**Listing 5:** MakPipe2

```
PROCEDURE MakPipe2
 0000       REM For a process with its standard input directed to
 0034       REM a given path and its standard output to a pipe.
 0066       PARAM Pgm:STRING
 006D       PARAM OutPath:BYTE \(* output from the new program
 0092       PARAM InPath:BYTE \REM Input for the new program
 00B5       TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
 00DA       DIM regs:registers
 00E3       DIM tmp,OldIn,OldOut:BYTE
 00F2
 00F3       REM Fix standard input
 0108       regs.a=0
 0113       RUN syscall($82,regs) \REM dup standard input
 0136       OldIn:=regs.a
 0141       CLOSE #0
 0146       regs.a:=InPath
 0152       RUN syscall($82,regs) \REM dup the input path into std in
 0181
 0182       REM Fix standard output
```

```
0198        regs.a=1
01A3        RUN syscall($82,regs)
01B1        OldOut:=regs.a
01BC        CLOSE #1
01C1        OPEN #tmp,"/pipe":UPDATE
01D1
01D2        REM Now standard input and output are redirected as they
0209        REM should be.  Fork the program
0228        regs.a:=0
0233        regs.b:=0
023E        regs.x:=ADDR(Pgm)
024C        regs.y:=0
0257        regs.u:=0
0262        RUN syscall($03,regs) \REM fork
0277
0278        REM now the process is running.
0296        REM clean up after it
02AA        regs.a:=1
02B5        RUN syscall($82,regs) \REM dup the new stdout
02D8        OutPath:=regs.a \REM save the pipe
02F3        CLOSE #1
02F8        regs.a:=OldOut
0304        RUN syscall($82,regs) \REM dup to restore the old standard output
033B        CLOSE #OldOut
0341
0342        REM now restore the old standard input
0367        CLOSE #0
036C        regs.a:=OldIn
0378        RUN syscall($82,regs) \REM dup
038C        CLOSE #OldIn
0392        END
```

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## Barden's Buffer

# Delving Into the CoCo Disk

### By William Barden, Jr.
### Rainbow Contributing Editor

I have to admit that I'm a little disconcerted by CoCo disks. There's really not much to work with in the way of disk system commands. I'm not talking about OS-9, now, where there are many commands related to disk files and directories, including a "tree" structure that allows you to build subdirectories. I'm talking about the Disk Extended Color BASIC commands. I feel like I never really know what's out there, where it is, how much space it takes, and how much space is left. In this column we'll look at Disk Extended Color BASIC system disk mysteries. Included will be a utility program to get a better directory listing and to list any file on the screen.

**Disk Basics**

If you're new to computers, you may be a bit dazzled by disk operation in general. The CoCo disks are standard disks similar to the ones used in such systems as the Tandy 1000 or IBM series. If you have a disk that is no longer any good, strip off the jacket and look at the actual disk inside. You'll see a circular piece of mylar coated with magnetic material, as shown in Figure 1. The center hole allows the disk drive to spin the disk at the speed of about 5 revolutions per second. The tiny hole out from the center hole is an *index hole*. This hole is detected by a light beam sensor and provides a known point on the disk. Another type of disk has 10 or so of these index holes evenly spaced around the disk; this type of disk is called "hard-sectored," while the CoCo disk is called "soft-sectored," for reasons we'll get into.

As the disk comes from the manufacturer, it contains nothing — it's just a jumble of magnetic oxide without any patterns, like an unused audio cassette. (Actually, there may be some patterns left over from disk testing at the manufacturer's, but that's meaningless to the CoCo.)

Data is written on the disk in *tracks* and *sectors*, as shown in Figure 2. Each track is defined by the action of the read/write head in the disk drive. This is a recording head mounted on an arm, similar to an audio recording head.

The arm can *step* a small amount in and out toward the center of the disk. Each time the arm steps an increment, the head moves over another track on the disk. The position of the track is determined by the position of the head and not by searching the disk for a magnetic pattern. If the head steps, it expects the data to be on the track underneath the head. The disk drive is manufactured with a set number of steps, defining a set number of tracks. For a CoCo disk, 35 tracks are used.

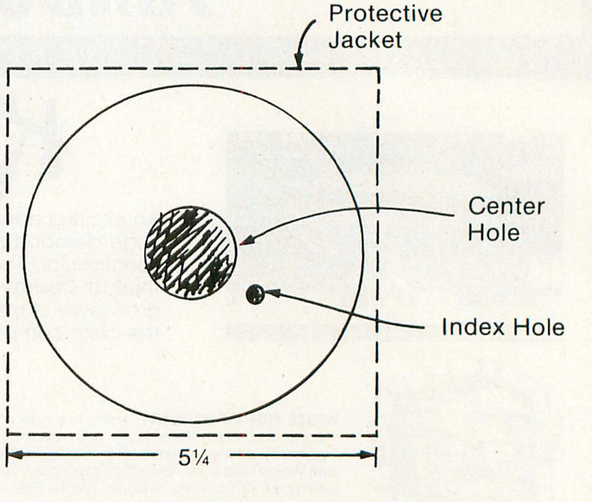

**Figure 1: CoCo Disk**

At this point we have the disk spinning under the head and arm arrangement at 5 revolutions per second. How can we access data? One way to do this would be to look for a particular pattern of data to come by under the head and then read from that point. Another way would be to look for the index hole, since the computer can tell when the index hole appears by an index hole sensing bit. However, index hole sensing isn't quite precise enough to use for defining where

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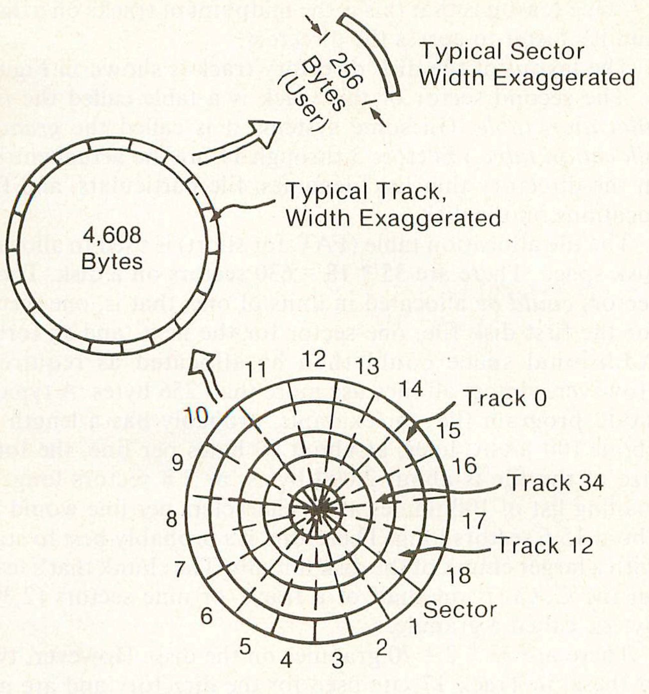

**Figure 2: Tracks and Sectors on a Disk**

data starts — there's some "slop" in the actual disk operation, a little bit of wobble in the disk, perhaps, and a slight variation in speed. As a result, the *disk controller* looks for the index hole to define the start of a new track and then looks for a certain bit pattern directly afterward to get in synchronization.

The pattern that the disk controller writes is called a disk *format* pattern. Formatting is done by the `DSKINI` command in BASIC, which executes a machine language formatting program. The result is a kind of "skeleton" pattern on the disk that defines the track start and end, and sectors for each of the 35 tracks on a disk. The format is like painted lines in an empty parking lot. There are 35 rows in the parking lot, numbered 0 to 34, and 18 spaces per row, numbered 1 through 18. The rows correspond to tracks, while the spaces within the rows correspond to sectors. The cars (data) haven't yet arrived.

Each sector on a track can hold 256 bytes of data. As you know, a byte corresponds to a character of data in a text, data, or BASIC file. Sector data is filled by BASIC commands such as `PRINT#` or `PUT#` or may be read or written by the special `DSKI$` or `DSKO$` commands. To read data, CoCo software must know the track number, the sector number, and the number of sectors to be read.

Data can be read or written only in sector multiples. You can't, for example, read from the middle of the sector. The disk hardware positions the head to a desired track, waits for the proper sector to come around (by reading sector numbers from the formatting skeleton) and then reads the user data within the sector.

Although it's possible to read one sector after another, sectors are usually numbered in an interleaved fashion, such as 1, 12, 5, 16, 9, 2, 13, 6, 17, 10, 3, 14, 7, 18, 11, 4, 15, and 8. Interleaving sectors in this manner allows some processing to take place before the next sector shows up (remember, the disk doesn't stop spinning!). There's a slight gap between each sector on a track. Each sector appears at 11/1,000-second (11 millisecond) intervals, not much time to do a lot of processing.

**File Management on Disk**

The tracks and special patterns for format data are about the only fixed factors in using disks. Sectors and other information are set by the formatting program or other software. A disk for a CoCo, for example, can be read on a Tandy 1000, assuming you have a smart enough program to send the proper commands to the disk controller hardware. Mark Data Products, for instance, has a CoCo utility program that allows a user to read and write CoCo data on MS-DOS computers.

There are many advertisers in RAINBOW that offer alternatives to the standard Radio Shack disk format. With the proper disk controller (the plug-in module that connects to your disk drives), it's possible to reliably use a 40-track, double-sided disk drive or even a hard drive of 20 megabytes! For the purposes of this column, though, we'll assume that you have a 35-track, single-sided drive and won't go into philosophical discussions about why Radio Shack decided to use only one side of a disk.

Assuming that you have 35 tracks and 18 sectors of 256 bytes per sector, the total disk space is

# bytes =35 tracks * 18 sectors/track * 256 bytes/sector
= 161,280 bytes.

How is disk space allocated to *files* such as BASIC programs, collections of data, text files, or other things to be stored on disk? One way would be to treat the disk as a long cassette

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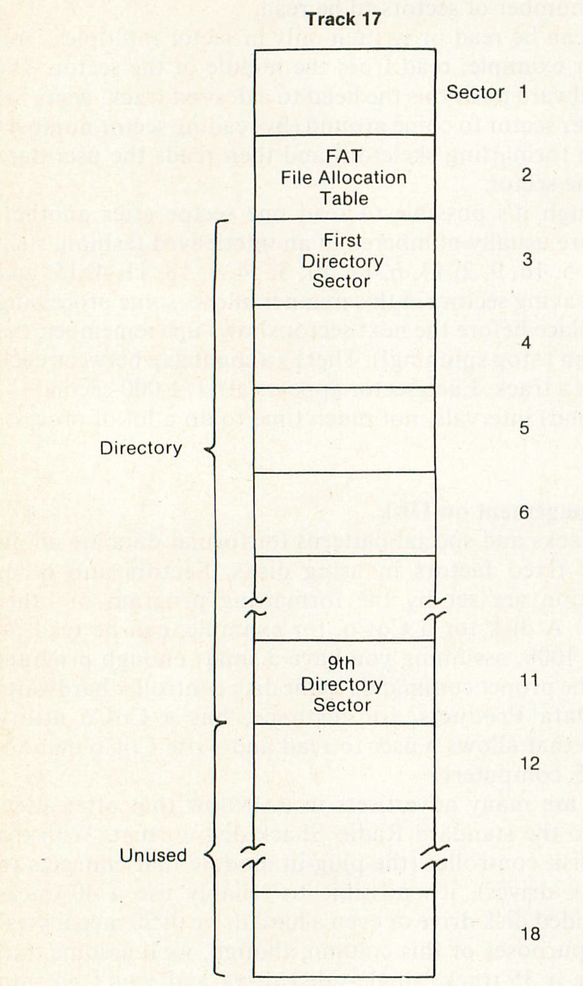

**Figure 3: Disk Directory Track**

tape and just store files in sequence from the first track and sector to the last track and sector. However, a disk, unlike a tape, does not have to be a *sequential* device. A disk is a *random access* device, as the head may be quickly moved to any track, and a sector may be located just as rapidly.

The time required to move to any track is about ¼-second, on the average. The time required to locate a given sector on a track is about one-half the rotational time — 100/1,000-second or 100 milliseconds. The total time to locate any spot on the disk is therefore about 350/1,000-second (350 milliseconds), on the average. For data on the same track or an adjacent track, the total time to locate the data is about a seventh of a second.

Once the data is located on the track, it can be read out at a rate of about 23,000 bytes per second, which corresponds to a track full of data in a fifth of a second.

### Where Are the Files?

How are files placed on the disk, and where are they? In the CoCo, and on many other computer systems, files are located by a reference table called a *disk directory*. The disk directory is located on Track 17 of the CoCo disk. Why Track 17? One reason is that this is the midpoint of tracks on a disk, and it's faster to access the directory.

The layout of the disk directory track is shown in Figure 3. The second sector of this track is a table called the *file allocation table*. (In some systems it is called the *granule allocation table*.) Sectors 3 through 11 are the actual entries in the directory that list filenames, file particulars, and file locations on the disk.

The file allocation table (FAT, for short) is used to allocate disk space. There are 35 * 18 = 630 sectors on a disk. These sectors *could be* allocated in units of one; that is, one sector for the first disk file, one sector for the next, and so forth. Additional space could then be allocated as required. However, almost all files use more than 256 bytes. A typical BASIC program file, for example, probably has a length of about 100 BASIC lines; at about 20 bytes per line, the total size of the file is about 2,000 bytes, or 7.8 sectors long. A mailing list of 100 names at 40 characters per line would be about 15.6 sectors long. Therefore, it's probably best to start with a larger chunk of the disk initially. The chunk that's used on the CoCo is one-half of a track, or nine sectors (2,304 bytes), called a granule.

There are 35 * 2 = 70 granules on the disk. However, two of these, in Track 17, are used for the directory and are not available for users. The total number of user granules is therefore 68. The FAT in Sector 2 uses one byte for each granule, making a total of 68 bytes in the table.

### Dumping a Typical Disk

Enough cerebral discussion. Let's see what a disk really looks like. Please note that, while the programs I offer this month will work on a CoCo 1 or CoCo 2, they are really intended for operation on a CoCo 3 in the 80-column mode. The program in Listing 1 uses `DSKI$` to read in any disk sector and dump the data to the CoCo screen in both hexadecimal and ASCII. `DSKI$` reads from a given drive number (0 or 1), track number (0-34), and sector number (1-18) into two strings, `A$` and `B$`. Two strings are used because the maximum length of a string is only 255 bytes, one less than the 256 bytes of data to be found on a disk sector. The program here just makes it easier to specify the track to be read and provides a convenient way to display the data.

The code here uses an outer I loop to print 16 lines of data. Each line prints eight bytes of `A$` and eight bytes of `B$`. Within the I loop are two loops that use variable `J`. The first part of this loop prints the next eight bytes of `A$`, and the second part prints the next eight bytes of `B$`. The 256 values from the sector are printed both as hexadecimal values of 00 through FF and as ASCII (text) characters. If the character from the sector is not an ASCII character, a period is printed instead.

The display for this code is shown in Figure 4. Pressing ENTER after the sector data has been printed will print the next sector on the disk. Entering any other character than ENTER will cause a return back to the prompt message for a new sector of data. The program enables any sector of the 630 sectors on disk to be printed.

Using dumps from a typical disk, let's take a look at the directory and file allocation sectors. The format of the directory is shown in Figure 5.

The directory is spread over sectors 3 through 11 of Track 17. Each entry in the directory takes 32 bytes. Comparing the directory format with the typical dump in Figure 4, you

```
DISK#, TRACK#, SECTOR# ? 1.17.7
00: 50 52 4F 50 41 4C 20 20 PROPAL        80: 50 52 4F 20 20 20 20 20 PRO
08: 54 58 54 03 00 33 00 D7 TXT..3.X      88: 42 49 4E 02 00 35 00 7E BIN..5.¯
10: 00 06 D7 00 00 00 00 00 ..W.....      90: 00 00 00 00 00 00 00 00 ........
18: 00 00 00 00 00 00 00 00 ........      98: 00 00 00 00 00 00 00 00 ........
20: 53 43 52 20 20 20 20 20 SCR           A0: 48 45 52 54 5A 43 56 20 HERTZCV
28: 42 49 4E 02 00 0D 00 43 BIN....C      A8: 42 49 4E 02 00 3C 00 49 BIN..<.I
30: 00 00 00 00 00 00 00 00 ........      B0: 00 00 00 00 00 00 00 00 ........
38: 00 00 00 00 00 00 00 00 ........      B8: 00 00 00 00 00 00 00 00 ........
40: 43 52 41 49 47 31 20 20 CRAIG1        C0: 48 53 50 52 4F 20 20 20 HSPRO
48: 54 58 54 01 FF 3A 00 96 TXT.....      C8: 42 41 53 00 00 3D 00 71 BAS..=.q
50: 00 00 00 00 00 00 00 00 ........      D0: 00 00 00 00 00 00 00 00 ........
58: 00 00 00 00 00 00 00 00 ........      D8: 00 00 00 00 00 00 00 00 ........
60: 43 52 41 49 47 32 20 20 CRAIG2        E0: 42 41 55 44 4F 54 32 20 BAUDOT2
68: 54 58 54 01 FF 3B 00 01 TXT..;..      E8: 54 58 54 01 FF 3F 00 B6 TXT..?.6
70: 00 00 00 00 00 00 00 00 ........      F0: 00 00 00 00 00 00 00 00 ........
78: 00 00 00 00 00 00 00 00 ........      F8: 00 00 00 00 00 00 00 00 ........
PRESS <ENTER> FOR NEXT, ANY OTHER KEY FOR NEW
```

Figure 4: Dump Program Display

can see that the 32 bytes take four display lines. The first line is the filename, padded with blanks to the right. The first name here is `PROPAL.TXT`. The next three bytes are the file extension, again padded to the right with blanks. The next byte, Byte 11, is a 00 for a BASIC program, 01 for a BASIC data file, 02 for a machine language program, and 03 for a text editor source file. The next byte, Byte 12, is a 00 if the file is in binary format and an FF if the file is in ASCII format. Remember that BASIC files can either be in binary format or ASCII format (they're in ASCII format if they are saved with the `,A` option.)

The next byte, Byte 13, is the number of the first granule in the file. The last two bytes, bytes 14 and 15, are the number of bytes in the last sector of the file. These three bytes, bytes 13 through 15, relate to the file allocation table in Sector 2. The file allocation table lists all 68 granules on the disk, one byte per granule. Each of these bytes contains a code that links one granule to another to define where a particular file is located. Remember that the directory entry pointed to the first granule. The byte for this granule in the file allocation table points to the next granule by number. When this granule is found in the file allocation table, it points to the *next* granule. This chain continues until the last granule is found.

Let's take a concrete example for this. The file `BAUDOT2.TXT` in the directory of Figure 4 points to the first granule in the file at Granule 3F hexadecimal (63 decimal).

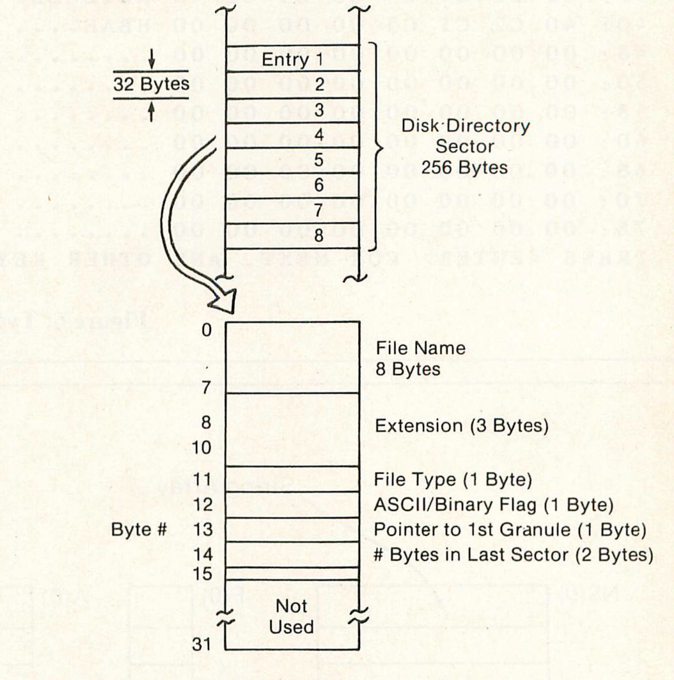

Figure 5: Disk Directory Format

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Looking at the file allocation table (see Figure 6), we see that this granule points to Granule 40. The granule at 40 is a C8, marking it as the last granule.

The least significant five bits in the last granule byte tell how many sectors, 1 through 9, are in the file. In this case, eight sectors are in the last granule of the file. The "chaining" of granules can go on for many granules in a long file; however, the last granule is always a CX-type granule. The directory bytes 14 and 15 tell how many bytes of the last sector are used in the file.

If a granule byte in the file allocation table is set to FF, it is free and can be used for a new file. There are none free in the example of Figure 6.

Although the granule chaining scheme seems complicated, it is necessary. When files are deleted, all granules associated with the file are deleted by setting their bytes in the file allocation table to FF. The directory entry in the disk directory is also deleted by FFs, which fill up the filename. This leaves "holes" in the disk space that can be used for segments of other files. When granules are allocated, a search is made of the file allocation table to find available space. For an often used disk, this space may not be contiguous —

```
DISK#. TRACK#. SECTOR#? 1.17.2
00: C5 C4 03 00 C4 02 07 04 ED..D...     80: 00 00 00 00 00 00 00 00 ........
08: 09 06 05 08 0A C1 0F C1 .....A.A     88: 00 00 00 00 00 00 00 00 ........
10: 01 3E C1 11 15 C4 C5 C8 .>A..DEH     90: 00 00 00 00 00 00 00 00 ........
18: C4 C3 C9 C3 1D C6 1F 1C DCIC.F..     98: 00 00 00 00 00 00 00 00 ........
20: C4 22 C4 C3 C5 C3 C2 28 D"DCECB(     A0: 00 00 00 00 00 00 00 00 ........
28: 29 2A C2 C3 C3 C4 C3 C5 )*BCCDCE     A8: 00 00 00 00 00 00 00 00 ........
30: C1 C2 C3 C7 36 C1 C8 C2 ABCG6AHB     B0: 00 00 00 00 00 00 00 00 ........
38: C1 C2 C9 C5 C3 C5 C2 40 ABIECEB@     B8: 00 00 00 00 00 00 00 00 ........
40: 40 C2 C1 C5 00 00 00 00 HBAE....     C0: 00 00 00 00 00 00 00 00 ........
48: 00 00 00 00 00 00 00 00 ........     C8: 00 00 00 00 00 00 00 00 ........
50: 00 00 00 00 00 00 00 00 ........     D0: 00 00 00 00 00 00 00 00 ........
58: 00 00 00 00 00 00 00 00 ........     D8: 00 00 00 00 00 00 00 00 ........
60: 00 00 00 00 00 00 00 00 ........     E0: 00 00 00 00 00 00 00 00 ........
68: 00 00 00 00 00 00 00 00 ........     E8: 00 00 00 00 00 00 00 00 ........
70: 00 00 00 00 00 00 00 00 ........     F0: 00 00 00 00 00 00 00 00 ........
78: 00 00 00 00 00 00 00 00 ........     F8: 00 00 00 00 00 00 00 00 ........
PRESS <ENTER> FOR NEXT. ANY OTHER KEY FOR NEW
```

Figure 6: Typical FAT Dump

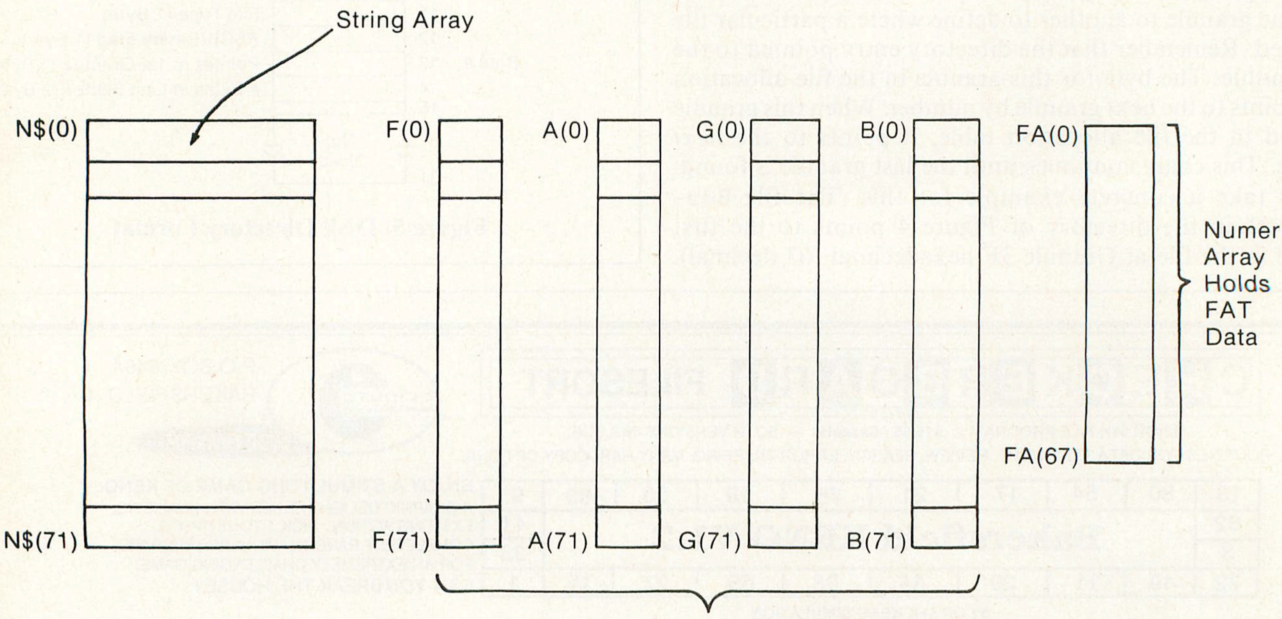

Figure 7: Arrays in Directory Program

the granules won't be right next to each other. Chaining is one way to link the "fragmented" granules of a file together and make full use of a limited amount of storage on disk.

### A Directory Program

We now know everything necessary to write a directory program that will list more data about disk files than we get with the BASIC `DIR` command. The program is shown in Listing 2 and has two main functions: listing the files on disk in first-in order, in screen segments (eliminating the annoying scroll-off-screen of `DIR`), giving the number of bytes taken by each file; and listing any file on the screen — something that can't be done from BASIC, short of reading in a program with BASIC or a text editor and listing it.

### Directory Listing

This part of the program first reads in the file allocation table and all directory entries from Track 17 into memory as entries in a series of arrays, as shown in Figure 7. This "stripping" of the directory is done by a subroutine, which is executed completely one time only. After the first time, the body of the subroutine is bypassed. The allocation table is read into array `FA()`, a 68-entry numeric array. Directory entries are broken up into an `N$()` array (name and extension), `F()` array (file type), `A()` array (ASCII flag), `G()` array (first granule), and `B()` array (bytes in last granule). The directory entry arrays are 72 entries long, the maximum number of entries in a disk directory.

The directory is listed to the screen in first-in order with the file type, ASCII/binary information and the number of bytes required for each file. Also listed are the number of *fragments* of the file. A fragment is a block of one or more granules. The fragment information is useful to see how a file is distributed over a disk. Disk accesses can be sped up greatly by reformatting a new disk and copying long files in sequence so that disk space is allocated in one block — this avoids a lot of time-consuming head movement.

A final summation lists the number of bytes used, the number of bytes remaining, and the number of granules inaccessible. The inaccessible bytes may occur if the granules in the FAT are not properly released to disk use. In one of my disks, there were six granules unaccounted for; whether this was an error in BASIC's file processing or my own operator error is debatable.

Figure 8 shows the new directory listing for a typical disk.

```
    NAME          TYPE      FORMAT    BYTES SEG
------------- ---------- ------       ----- ---
ED       .BAS BASICPROG  BINARY        2304   1
ED%      .BIN MACHINELA  BINARY        4608   1
AS       .BAS BASICPROG  BINARY        2304   1
AS%      .BIN MACHINELA  BINARY        9216   2
DCBUG    .BIN MACHINELA  BINARY        2304   1
XFER     .BAS BASICPROG  BINARY        2304   1
FILELIST.BAS BASICPROG  BINARY        2304   1
HLP%     .    BASICDATA  ASCII         9216   1
DISPLAY  .TXT BASICDATA  ASCII         2304   1
EXSQR    .TXT BASICDATA  ASCII         2304   1
BLKWHT   .TXT BASICDATA  ASCII         2304   1
EXSCROLL.TXT BASICDATA  ASCII         2304   1
TOWERS   .TXT BASICDATA  ASCII         2304   1
TEXTOUT  .TXT BASICDATA  ASCII         2304   1
DRAWLINE.TXT BASICDATA  ASCII         2304   1
ASP      .BAS BASICPROG  BINARY        2304   1
SVNBY9   .BAS BASICPROG  BINARY        2304   1
GENCHLP  .BAS BASICPROG  BINARY        4608   1
BAUDOT1  .TXT BASICDATA  ASCII         6912   3
EIGHTBY9.BAS BASICPROG  BINARY        2304   1
PROPOR   .BAS BASICPROG  BINARY        2304   1
BASPR2   .BAS BASICPROG  BINARY        2304   1
FIG20719.TXT TEXTEDITR  BINARY        2304   1
DOS      .BAS BASICPROG  BINARY        4608   1
DOS      .BIN MACHINELA  BINARY        4608   2
SCRIP    .BIN MACHINELA  BINARY       13824   5
XF       .BAS BASICPROG  BINARY        2304   1
LIST     .BAS BASICPROG  BINARY        2304   1
AXS      .BAS BASICPROG  BINARY        2304   1
BAUDOT   .BIN MACHINELA  BINARY        2304   1
GRAPHICS.BAS BASICPROG  BINARY        4608   2
GETF     .TXT BASICDATA  ASCII         2304   1
PROPAL   .TXT TEXTEDITR  BINARY        2304   1
SCR      .BIN MACHINELA  BINARY        2304   1
CRAIG1   .TXT BASICDATA  ASCII         2304   1
CRAIG2   .TXT BASICDATA  ASCII         2304   1
PRO      .BIN MACHINELA  BINARY        2304   1
HERTZCV  .BIN MACHINELA  BINARY        2304   1
HSPRO    .BAS BASICPROG  BINARY        2304   1
BAUDOT2  .TXT BASICDATA  ASCII         4608   1
BAUDOT2  .BIN MACHINELA  BINARY        2304   1
BIGNUM   .BAS BASICPROG  BINARY        2304   1
DUMP     .BAS BASICPROG  ASCII         2304   1
TOTAL BYTES= 142848 # BYTES LEFT= 0
 6 GRANULES INACCESSIBLE ( 13824 BYTES)
 43 TOTAL FILES
```

**Figure 8: Typical Directory Listing**

### Listing Files

The listing portion of the program also first reads in the directory into the arrays listed above unless previously done by a directory function. The code then uses the filename

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entered by the operator to search the in-memory directory. Some reformatting is required here as the in-memory name is padded with blanks and contains no period between name and extension.

If the file is found, the first granule location is picked up from the `G` array. The chain of granules is followed until the end granule. Each granule located is converted to a track and sector number and used in a `DSKI$` statement to read in the appropriate sector as `A$` and `B$`. These strings are then printed.

Most granules use all nine sectors, and a loop prints the entire granule with nine successive reads. However, end granules result in reads of only the required number of sectors (found from the CX granule) and a print of only the first portion of the last sector (found from the `B` array — the number of bytes in the last sector). Figure 9 shows a typical listing for the list function. Any ASCII file will print out properly formatted, and even non-ASCII files may contain useful information for identification purposes.

Next month we'll have more on CoCo topics. 'Til then, watch those inaccessible granules! ☐

```
 ORG $3E00
***********************************************
* BAUDOT (MURRAY) TELETYPE SUBROUTINE         *
* READS RADIO TELETYPE CHARACTER THROUGH CAS- *
* ETTE PORT AND SENDS TO SCREEN DRIVER        *
***********************************************
LETS EQU $1F LETTERS CODE
FIGS EQU $1B FIGURES CODE
* WORKING STORAGE
DELCNT FDB 1000 1/2 BIT TIME DELAY
BIT1 FDB 0 ONE BIT COUNT
INVERT FCB 0 0=NORMAL, 1=INVERTED
LETFIG FCB 0 0=LETTERS, 32=FIGURES
SCREEN FDB 0 SCREEN PNTR
BAUDOT ORCC #$50 RESET INTRPTS
 JSR CLRSCN CLEAR SCREEN
 CLRA
 STA $6F DEVNO FOR DISPLAY
 LDX #$400 START OF SCREEN
 STX SCREEN INITIALIZE
BAU002 JSR LOOKST WAIT TIL STARTCHAR
 JSR HBIT DELAY 1/2 BIT TIME
 JSR HBIT DELAY 1/2 BIT TIME
```

**Figure 9: Typical Listing**

**Listing 1:** `DISKDUMP`

```
100 '============================
====================================
============
110 '
120 ' DISK DUMP PROGRAM
130 CLEAR 1000
140 CLS
150 INPUT "DISK#, TRACK#, SECTOR
 #"; DN, TN, SN
160 DSKI$ DN, TN, SN, A$, B$
170 '-------------------
180 FOR I=0 TO 15
190 PRINT RIGHT$( "0" +  HEX$( I
 * 8 ), 2 ) + ": ";
200 FOR J=0 TO 7
210 '-------------------
220 C$=MID$(A$, (I)*8 + J + 1, 1
)
230 C$=HEX$( ASC( C$ ) )
240 PRINT RIGHT$( "0" + C$, 2 )
+ " ";;
250 NEXT J
260 '-------------------
270 FOR J = 0 TO 7
280 C$=MID$( A$, I*8 + J + 1, 1)
290 IF C$<" " THEN PRINT "."; EL
SE PRINT C$;
300 NEXT J
310 '-------------------
320 PRINT "    ";
330 PRINT RIGHT$( "0" + HEX$( I
 * 8 + 128 ), 2 ) + ": ";
340 '-------------------
350 FOR J=0 TO 7
360 C$=MID$(B$, (I)*8 + J + 1, 1
)
370 C$=HEX$( ASC( C$ ) )
380 PRINT RIGHT$( "0" + C$, 2 )
+ " ";;
390 NEXT J
400 '-------------------
410 FOR J = 0 TO 7
420 C$=MID$( B$, I*8 + J + 1, 1)
430 IF C$<" " THEN PRINT "."; EL
SE PRINT C$;
440 NEXT J
450 '-------------------
460 PRINT
470 NEXT I
480 '-------------------
490 PRINT "PRESS <ENTER> FOR NEX
T, ANY OTHER KEY FOR NEW"
500 A$=INKEY$: IF A$="" THEN 500
510 IF A$<>CHR$(13) THEN GOTO 14
0
520 SN=SN+1: IF SN=19 THEN SN=1:
 TN=TN+1: IF TN=35 THEN TN=0
530 PRINT USING "DISK NO: # TRAC
K NO: ## SECTOR NO: ##"; DN, TN,
 SN
 540 GOTO 160
 550 '
 560 '============================
====================================
============
340 .......14   880 ......145
510 ......158   1140 .....180
710 ......210   END .......2
```

**Listing 2:** `DISKDIR`

```
100 '============================
==============================
==============
110 ' DISK DIR/LIST UTILITY
120 ' LISTS DIRECTORY IN FIRST-I
N ORDER, LISTS ANY FILE ON SCREE
N.
130 CLEAR 2000
140 DIM FA( 67 )
150 DIM N$( 71 )
160 DIM F( 71 )
170 DIM A( 71 )
180 DIM G( 71 )
190 DIM B( 71 )
200 FT = 0
210 CLS
220 PRINT "DIR/LIST UTILITY"
230 PRINT
240 PRINT "   1. DIR"
250 PRINT "   2. LIST"
260 PRINT
270 INPUT "SELECTION (1-2)"; RE
280 IF RE < 1 OR RE > 2 THEN 270
290 ON RE GOTO 320,630
300 '
310 '============================
==============================
==============
320 ' DIR FUNCTION
330 CLS
340 PRINT "    NAME          TYPE
  FORMAT   BYTES SEG"
350 PRINT "----------- --------
- ------   ----- ---"
360 GOSUB 970
370 TB = 0: TL = 0: NF = 0
380 FOR I = 0 TO 71
390 IF N$( I ) = STRING$( 11, CH
R$( 255 ) ) THEN GOTO 550
400 NF = NF + 1
410 A$ = LEFT$( N$( I ), 8 ) + "
." + MID$( N$( I ), 9, 3 )
420 A$ = A$ + " " + MID$( "BASIC
PROGBASICDATAMACHINELATEXTEDITR"
                          F( I )
,
* 9 + 1, 9 )
430 IF A( I ) = 0 THEN A$ = A$ +
 " BINARY " ELSE A$ = A$ + " ASC
```

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```
II "
440 BY = 0: NG = 1
450 HD = G( I )
460 IF FA( HD ) > 67 THEN GOTO 5
10
470 BY = BY + 2304
480 IF FA( HD ) - HD <> 1 THEN N
G = NG + 1
490 HD = FA( HD )
500 GOTO 460
510 BY = BY + 2304
520 PRINT A$;: PRINT USING " ###
### ##"; BY, NG
530 TL = TL + 1: IF TL = 20 THEN
 TL = 0: GOSUB 1280
540 TB = TB + BY
550 NEXT I
560 PRINT "TOTAL BYTES="; TB;"#
BYTES LEFT="; 2304*FG
570 PRINT 68 - TB/2304 - FG; "GR
ANULES INACCESSIBLE ("; 156672 -
 TB - FG*2304;      "BYTES)"
580 PRINT NF; "TOTAL FILES"
590 GOSUB 1280
600 GOTO 210
610 '
620 '=============================
==================================
==============
630 ' LIST FUNCTION
640 GOSUB 970
650 CLS
660 INPUT "FILE TO LIST"; RE$
670 IF LEN( RE$ ) = 0 THEN GOTO
940 ELSE IF LEN( RE$ ) <= 12 THE
N GOTO 690
680 GOTO 650
690 FOR L = 1 TO LEN( RE$ )
700 IF ( MID$( RE$, L, 1 ) = " "
 ) OR ( MID$( RE$, L, 1 ) = "."
)  THEN GOTO 720
710 NEXT L
720 C$ = LEFT$( LEFT$( RE$, L -
1 ) + "       ", 8 )
730 C$ = C$ + LEFT$( MID$( RE$,
L + 1, 3 ) + "   ", 3 )
740 FOR I=0 TO 71
750 IF N$( I ) = C$ THEN 790
760 NEXT I
770 PRINT "FILE "; RE$; " NOT FO
UND"
780 GOTO 930
790 HD = G( I )
800 IF HD > 33 THEN TK = INT( (
HD + 2 ) / 2 ) ELSE TK = INT( HD
 / 2 )
810 SC = ( ( HD AND 1 ) * 9 ) +
1
```

```
820 IF FA(HD) <= 67 THEN J = 9 E
LSE J = FA( HD ) AND 31
830 FOR L = 1 TO J
840 DSKI$ 0, TK, SC, A$, B$
850 IF FA( HD ) <= 67 THEN PRINT
 A$; B$;: GOTO 890
860 IF L <> J THEN PRINT A$; B$;
: GOTO 890
870 IF B( I ) <= 128 THEN PRINT
LEFT$( A$, B( I ) )
880 IF B( I ) > 128 THEN PRINT A
$;: PRINT LEFT$( B$, B( I ) - 12
8  );
890 SC=SC + 1
900 NEXT L
910 IF FA( HD ) > 67 THEN 920 EL
SE HD = FA( HD ): GOTO 800
920 PRINT
930 GOSUB 1280
940 GOTO 210
950 '
960 '===========================
==================================
==============
970 ' READ IN AND STRIP DIRECTOR
Y
980 IF FT = 1 THEN GOTO 1250
990 DSKI$ 0, 17, 2, A$, B$
1000 FG = 0
1010 FOR I = 0 TO 67
1020 FA(I) = ASC( MID$( A$, I +
1, 1 ) )
1030 IF FA(I) = 255 THEN FG = FG
 + 1
1040 NEXT I
1050 K = 0
1060 FOR I = 3 TO 11
1070 DSKI$ 0, 17, I, A$, B$
1080 FOR J = 0 TO 3
1090 N$( J + K ) = MID$( A$, J *
 32 + 1, 11 )
1100 F( J + K ) = ASC( MID$( A$,
 J * 32 + 12, 1 ) )
1110 A( J + K ) = ASC( MID$( A$,
 J * 32 + 13, 1 ) )
1120 G( J + K ) = ASC( MID$( A$,
 J * 32 + 14, 1 ) )
1130 B( J + K ) = ASC( MID$( A$,
 J * 32 + 15, 1 ) ) * 256 +

  ASC( MID$( A$, J * 32 + 16, 1
) )
1140 NEXT J
1150 FOR J = 0 TO 3
1160 N$( J + K + 4 ) = MID$( B$,
 J * 32 + 1, 11 )
1170 F( J + K + 4 ) = ASC( MID$(
 B$, J * 32 + 12, 1 ) )
1180 A( J + K + 4 ) = ASC( MID$(
 B$, J * 32 + 13, 1 ) )
1190 G( J + K + 4 ) = ASC( MID$(
 B$, J * 32 + 14, 1 ) )
1200 B( J + K + 4 ) = ASC( MID$(
 A$, J * 32 + 15, 1 ) ) * 256 +

      ASC( MID$( B$, J * 32 + 16
, 1 ) )
1210 NEXT J
1220 K = K + 8
1230 NEXT I
1240 FT = 1
1250 RETURN
1260 '
1270 '===========================
==================================
==============
1280 ' MORE SUBROUTINE
1290 PRINT "PRESS ANY KEY TO CON
TINUE"
1300 D$=INKEY$: IF D$="" THEN 13
00
1310 RETURN
1320 '===========================
==================================
==============
```

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| Lincoln | Nebraska Bookstore |
| Omaha | Nelson News |

**NEVADA**

| | |
|---|---|
| Carson City | Bookcellar |
| Las Vegas | Hurley Electronics |
| | Steve's Books & Magazines |

**NEW HAMPSHIRE**

| | |
|---|---|
| Manchester | Bookwrights |
| West Lebanon | Verham News Corp. |

**NEW JERSEY**

| | |
|---|---|
| Atlantic City | Atlantic City News Agency |
| Cedar Knolls | Village Computer & Software |
| Clinton | Micro World II |
| Marmora | Outpost Radio Shack |
| Pennsville | Dave's Elect. Radio Shack |
| Rockaway | Software Station |

**NEW MEXICO**

| | |
|---|---|
| Alamogordo | New Horizons Computer Systems |
| Albuquerque | Front Page Newsstand |
| | Page One Newsstand |
| Santa Fe | Downtown Subscription |

**NEW YORK**

| | |
|---|---|
| Amherst | Village Green-Buffalo Books |
| Brockport | Lift Bridge Book Shop, Inc. |
| Brooklyn | Cromland, Inc. |
| Elmira Heights | Southern Tier News Co., Inc. |
| Fredonia | On Line: Computer Access Center |
| Hudson Falls | G.A. West & Co. |
| Huntington | Oscar's Bookshop |
| Johnson City | Unicorn Electronics |
| New York | Barnes & Noble—Sales Annex |
| | Coliseum Books |
| | Eastern Newsstand |
| | Grand Central Station, Track 37 |
| | 200 Park Ave., (Pan Am #1) |
| | 55 Water Street |
| | World Trade Center #2 |
| | First Stop News |
| | Idle Hours Bookstore |
| | International Smoke Shop |
| | Jonil Smoke |
| | Penn Book |
| | Software City |
| | State News |
| | Walden Books |
| | World Wide Media Services |

**NEW YORK (cont'd)**

| | |
|---|---|
| Pawling | Universal Computer Service |
| Rochester | Village Green |
| | World Wide News |
| Woodhaven | Spectrum Projects |

**NORTH CAROLINA**

| | |
|---|---|
| Cary | News Center in Cary Village |
| Chapel Hill | University News & Sundry |
| Charlotte | Newsstand Int'l |
| | Papers & Paperback |
| Havlock | Computer Plus |
| Hickory | $C^2$ Books & Comics |
| Jacksonville | Michele's, Inc. |
| Kernersville | K & S Newsstand |
| Marion | Boomers Rhythm Center |
| Winston-Salem | K & S Newsstand (3 Locations) |
| | Rainbow News Ltd. |

**OHIO**

| | |
|---|---|
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| Blanchester | JR Computer Control |
| Canton | Little Professor Book Center |
| Chardon | Thrasher Radio & TV |
| Cincinnati | Cinsoft |
| Cleveland | Erieview News |
| Columbiana | Fidelity Sound & Electronics |
| Columbus | B5 Software |
| | Micro Center |
| | The Newsstand |
| Dayton | Books & Co. |
| | Huber Heights Book & Card |
| | Wilke News |
| | Wright News & Books |
| Dublin | Book Barn |
| Fairborn | News-Readers |
| | Wilke's University Shoppe |
| Findley | Open Book |
| Kent | The News Shop |
| Lakewood | Lakewood International News |
| Lima | Edu-Caterers |
| Miamisburg | Wilke News |
| Parma | Bookmark Newscenter |
| Toledo | Leo's Book & Wine Shop |
| Warren | Book Nook, Inc. |
| Xenia | Fine Print Books |
| Youngstown | Plaza Book & Smoke Shop |

**OKLAHOMA**

| | |
|---|---|
| Oklahoma City | Merit Micro Software |
| Taklequah | Thomas Sales, Inc. dba Radio Shack |
| Tulsa | Steve's Book Store |

**OREGON**

| | |
|---|---|
| Eugene | Libra Books — Book Mark |
| Portland | Fifth Avenue News |
| | Rich Cigar Store, Inc. |
| | Sixth & Washington News |
| Salem | Capitol News Center |
| | Checkmate Book |

**PENNSYLVANIA**

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|---|---|
| Allentown | Owl Services |
| Altoona | Newborn Enterprises |
| Bryn Mawr | Bryn Mawr News |
| Feasterville | Global Books |
| King of Prussia | Gene's Books |
| Malvern | Personal Software |
| Phoenixville | Stevens Radio Shack |
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| Warwick | Software Connection |

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| Clemson | Clemson Newsstand |
| Florence | Ray's #1 |
| Greenville | Palmetto News Co. |
| Spartanburg | Software City |
| Union | Fleming's Electronics |

**TENNESSEE**

| | |
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| Chattanooga | Anderson News Co. |
| | Guild Books & Periodicals |
| Dickson | Highland Electronics |
| Knoxville | Anderson News Co. |
| | Davis-Kidd Bookseller |
| Memphis | Computer Center |
| Nashville | Davis-Kidd Booksellers |
| | Mosko's Place |
| | R.M. Mills Bookstore |

**TENNESSEE (cont'd)**

| | |
|---|---|
| Smyrna | Delker Electronics |

**TEXAS**

| | |
|---|---|
| Big Spring | Poncho's News |
| Brenham | Moore's Electronics |
| Desoto | Maxwell Books |
| Elgin | The Homing Pigeon |
| Harlington | Book Mark |

**UTAH**

| | |
|---|---|
| Provo | Valley Book Center |

**VIRGINIA**

| | |
|---|---|
| Danville | K & S Newsstand |
| Hampton | Benders |
| Norfolk | I-O Computers |
| | Turn The Page |
| Richmond | Volume I Bookstore |

**WASHINGTON**

| | |
|---|---|
| Port Angeles | Port Book & News |
| Seattle | Adams News Co., Inc. |
| | Bulldog News |
| Tacoma | B & I Magazines & Books |
| | Nybbles 'N Bytes |

**WEST VIRGINIA**

| | |
|---|---|
| Huntington | Nick's News |
| Logan | Stan's Electronics & Radio Shack |
| Madison | Communications, LTD |
| Parkersburg | Valley News Service |
| South Charleston | Spring Hill News |

**WISCONSIN**

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|---|---|
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| Cudahy | Cudahy News & Hobby |
| Kenosha | R.K. News, Inc. |
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| | University Bookstore |
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| Racine | Little Professor Book Center |
| Waukesha | Holt Variety |

**ARGENTINA**

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|---|---|
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**AUSTRALIA**

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|---|---|
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| Kingsford | Paris Radio Electronics |

**CANADA:**
**ALBERTA**

| | |
|---|---|
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| Blairmore | L & K Sports & Music |
| Bonnyville | Paul Tercier |
| Brooks | Double "D" A.S.C. Radio Shack |
| Calgary | Billy's News |
| Claresholm | Radio Shack Associated Stores |
| Drayton Valley | Langard Electronics |
| Edmonton | CMD Micro |
| Edson | Radio Shack, asd |
| Fairview | D.N.R. Furniture & TV |
| Fox Creek | Fox City Color & Sound A.S.C. Radio Shack |
| Ft. Saskatchewan | Ft. Mall Radio Shack, ASC |
| Grande Cache | The Stereo Hut |
| Grande Centre | The Book Nook |
| Hinton | Jim Cooper |
| Innisfail | L & S Stereo |
| Lecombe | Brian's Electronics |
| Leduc | Radio Shack Associated Stores |
| Lethbridge | Datatron |
| Lloydminster | Lloyd Radio Shack |
| Okotoks | Okotoks Radio Shack |
| Peace River | Radio Shack Associated Stores |
| | Tavener Software |
| St. Paul | Walter's Electronics |
| Stettler | Stettler Radio Shack |
| Strathmore | Wheatland Electronics |

**ALBERTA (cont'd)**

| | |
|---|---|
| Taber | Pynewood Sight & Sound |
| Westlock | Westlock Stereo |
| Wetaskiwin | Radio Shack |

**BRITISH COLUMBIA**

| | |
|---|---|
| Burnaby | Compulit |
| Burns Lake | VT. Video Works |
| Campbell River | TRS Electronics |
| Chilliwack | Charles Parker |
| Coortenay | Rick's Music & Stereo |
| Dawson Creek | Bell Radio & TV |
| Golden | Taks Home Furnishings |
| Kelowna | Telesoft Marketing |
| Langley | Langley Radio Shack |
| N. Vancouver | Microwest Distributors |
| Nelson | Oliver's Books |
| Parksville | Parksville TV |
| Penticton | D.J.'s |
| | Four Corner Grocery |
| Sidney | Sidney Electronics |
| Smithers | Wall's Home Furniture |
| Squamish | Kotyk Electronics |
| 100 Mile House | Tip Top Radio & TV |

**MANITOBA**

| | |
|---|---|
| Altona | L.A. Wiebr Ltd. |
| Lundar | Goranson Elec. |
| Morden | Central Sound |
| The Pas | Jodi's Sight & Sound |
| Selkirk | G.L. Enns Elec. |
| Virden | Archer Enterprises |
| Winnipeg | J & J Electronics Ltd. |

**NEW BRUNSWICK**

| | |
|---|---|
| Moncton | Jeffries Enterprises |
| Sussex | Dewitt Elec. |

**NEWFOUNDLAND**

| | |
|---|---|
| Botwood | Seaport Elec. |
| Carbonear | Slade Realties |

**NOVA SCOTIA**

| | |
|---|---|
| Halifax | Atlantic News |

**ONTARIO**

| | |
|---|---|
| Angus | Micro Computer Services |
| Aurora | Compu Vision |
| Concord | Ingram Software |
| Exceter | J. Macleane & Sons |
| Hanover | Modern Appliance Centre |
| Huntsville | Huntsville Elec. |
| Kenora | Donny "B" |
| Kingston | T.M. Computers |
| Listowel | Modern Appliance Centre |
| South River | Max TV |
| | Dennis TV |

**QUEBEC**

| | |
|---|---|
| LaSalle | Messageries de Presse Benjamin Enr. |
| Pont. Rouge | Boutique Bruno Laroche |
| Ville St. Gabriel | Gilles Comeau Enr/Radio Shack |

**SASKATCHEWAN**

| | |
|---|---|
| Assiniboia | Telstar News |
| Estevan | Kotyk Electronics |
| Moose Jaw | D&S Computer Place |
| Nipiwan | Cornerstone Sound |
| Regina | Regina CoCo Club |
| | Software Supermarket |
| Saskatoon | Everybody's Software Library |
| Shellbrooke | Gec. Laberge Radio Shack |
| Tisdale | Paul's Service |
| Unity | Grant's House of Sound |

**YUKON**

| | |
|---|---|
| Whitehorse | H & O Holdings |

**JAPAN**

| | |
|---|---|
| Tokyo | America Ado, Inc. |

**PUERTO RICO**

| | |
|---|---|
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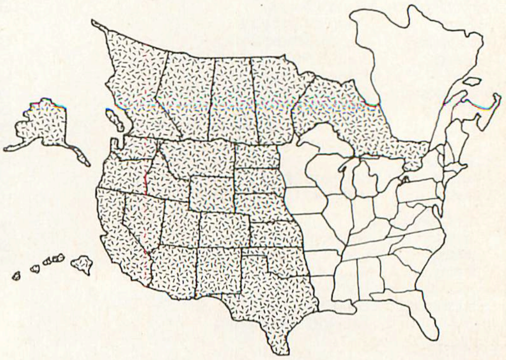

Sugar Software

# Sugar Software Gazette

Volume 1 Issue 1 — Winter, 1988

## OS9 Calligrapher

Turn your CoCo into a calligrapher"s quill. Make beautiful invitations, diplomas, certificates, love letters and labels. Use your CoCo for desktop publishing to print newsletters, flyers and ads. All this is possible with the OS9 Calligrapher.

The OS9 Calligrapher is a text formatting program for OS9. It reads a standard file which contains text and formatting codes.

## Calligrapher Type Styles

Calli uses many different type styles in both half and quarter inch size which are printed on a dot-matrix printer. For example, this ad was formatted and printed using the OS9 Calligrapher.

The OS9 Calligrapher comes with three half-inch fonts:

Old English

Gay Nineties

Cartoon

Many other fonts are available.

## CoCo Calligrapher

The CoCo Calligrapher prints the same fonts as the OS9 Calligrapher. Though not as powerful as the OS9 Calli, the CoCo Calli is an easy to use, menu driven program for those of you that don"t use OS9. It can print lines left justified or centered and can print in condensed mode on some printers.

Either Calligrapher may be purchased with all 54 fonts as a Combo Package.

---

**The Calligrapher Programs** - Both the OS9 and CoCo Calligrapher come with three ½-inch fonts: Old English, Gay Nineties and Cartoon. Both come with support for Epson, Gemini, Radio Shack, Okidata 92A, Banana and Prowriter printers. Both print the same fonts.

**CoCo Calligrapher** - (Hybrid BASIC/ML) Tape or Disk; **$24.95**.

**OS9 Calligrapher** - (C) Requires OS9 Level I or II; Disk only; **$24.95**.

**The Calligrapher Fonts** - Requires OS9 or CoCo Calligrapher. Each set on tape or disk; **$14.95** each. **Set #1** - (9 fonts) Reduced, reversed and reduced-reversed versions of Gay Nineties, Old English and Cartoon; **Set #2** - (8 fonts) Old Style and Broadway; **Set #3** - (8 fonts) Antique and Business; **Set #4** - (8 fonts) Wild West and Checkers; **Set #5** - (10 fonts) Stars, Hebrew and Victorian; **Set #6** - (8 fonts) Block and Computer;

**The Economy Font Packages** on disk; **29.95: Font Package #1** - Above font sets 1, 2 and 3 (25 fonts) on one disk. **Font Package #2** - Above font sets 4, 5 and 6 (26 fonts) on one disk. Both Packages #1 and #2 (51 fonts); Disk only; **49.95**.

**The Calligrapher Combo** - *Everything!*; Our most popular package includes the Calligrapher and *both* Font Packages (51 fonts); Disk only; **$69.95**.

This ad was composed using ½-inch **Reversed Old English** for the headline, ¼-inch **Block** for headers and ¼-inch **Checks** for the body. A 2½-inch column was printed and cut to three columns. The sample fonts shown above are ¼-inch although the ½-inch versions are included with the Calligrapher programs. *Specify OS9 or CoCo (RSDOS) when ordering.*

**A complete catalog of other sweet Sugar Software products is available.**

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*TRS-80 is a trademark of Tandy Corp.

SUGAR SOFTWARE
**P.O. Box 7446**
**Hollywood, Florida 33081**
**(305) 981-1241**

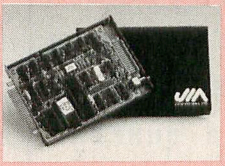
*All programs run on the CoCo 1, 2 and 3, 32K Extended Basic, unless otherwise noted.* Add $1.50 per tape or disk for postage and handling. Florida residents add 5% sales tax. COD orders add $4. Dealer inquiries invited. Orders generally shipped in 24-48 hours. No refunds or exchanges without prior authorization.

# Star NX-10 Printer Only $238
# NOW WITH FREE SP-C ($68.45 value)

## DISK CONTROLLER
## NEW FROM J&M

The DC-4 is a scaled-down version of the popular DC-2 without a parallel port. It includes a switch with 2 ROM sockets, JDOS, manual and such features as gold connectors and metal box. It accesses double sided drives and accepts RSDOS 1.1 for Radio Shack compatability.

**$65** DC-4 with memory minder
($2 shipping)



## RS DOS ROM CHIP

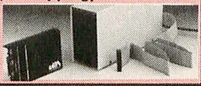
ROM chip fits inside disk controller. 24 pin fits both J&M and RS controller Release 1.1. For CoCo 3 Compatability.

**$20** each Reg. $40
($2 shipping)

## DISK DRIVE SPECIALS
## DRIVE Ø +

Howards Drive 0 gives you a DD-3 MPI drive, a CA-1 cable and a J&M DC-4 Disk Controller for only. Add $34 for a Disto DC-3 replacement. ($5 shipping)

**$178⁴⁵** DOUBLE SIDED DOUBLE DENSITY 360K



### Separate Disk Drive Components

**DD-3** An MPI 52 double-sided, double density, 360K disk drive in a full height case and heavy-duty power supply.

**$98** ($2 shipping) **DRIVE ONE**

**TEAC T-3** ½ height, double sided, double density, 720K bare drive, includes all mounting hardware.

**NEW $159** ($2 shipping)

**TEAC 55B** bare drive, ½ height, double-sided, double density with all mounting hardware, needs CA-2 below to fit R.S. 501.

**$118** ($2 shipping) **BARE**

### SP-C

Serial to parallel converter converts the CoCo 4 pin serial output to run a parallel printer like Star or Epson. Includes all cables. Add $10 for modem attachment.

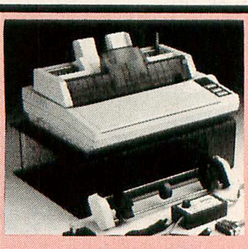
($2 shipping) **$68.⁴⁵**

**CA-1** Cable that connects the disk controller to the drive.

**$24⁹⁵** One Drive CA-2 **$29⁹⁵** Two Drive

**GUARANTEE** — Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out, test it for compatibility. If you're not happy with it for any reason, return it in 30 days and we'll give you your money back (less shipping).

## EPSON
### LX-800 $239



Friction and tractor feed included
1 60 CPS
3K Buffer
NLQ on front buttons
Package includes free SP-C serial to parallel converter and Epson tutorial on disk.

## Star NX-10 Only $238

FREE SP-C serial to parallel converter while supplies last ($5 shipping)

**WORD PACK RS** $49

**BASIC SCREEN EDITOR** $19.⁹⁵

- Full documentation
- Works on CoCo 1, 2 & 3
- Add lines without renumbering

**MYDOS** by Chris Hawks $15

- Simplify your directory
- Accesses double sided drives
- Use J&M on CoCo 3

**CoCo MAX** by Colorware $78.⁴⁵

- Specify II or III
- Includes high res interface
- Animation
- Printers supported include, R.S. 105, 106, 130: Star: & Epson

($2 shipping on software)

## MONITORS

### Sony KV-1311CR $449

Regular $625
($15 shipping)

- Vivid Color
- Vertically flat 13" screen
- Monitor/Trinitron TV with remote control
- 640 X 240 resolution at 15MHZ .37 mm Dot pitch
- RGB analog & digital; TTL; and composite inputs
- VCR inputs
- Cable to CoCo 3 $36

### SONYCPD-1310 $375

Regular $550
($15 shipping)

- Monitors versions of KV-1311CR, above without TV
- Cable to CoCo 3 $36

## HARD DRIVE

- 20,000,000 Bytes
- equivalent to 125 R.S. 501's on line
- micro stepping heads have 15 position per track
- automatic temperature compensation realigns head every five minutes for trouble free reads and writes
- will also work with IBM & clones
- complete package includes 20 meg drive, case & power supply, controller, and interface that plugs into slot #3 of multipack interface.
- 1 year warranty

**$699.⁰⁰**
(5 ship)

BASIC driver lets you access this hard drive without need for OS-9 $49.95.

**Howard Medical Computers 1690 N. Elston Chicago, IL 60622**

ORDERS
**(800) 443-1444**

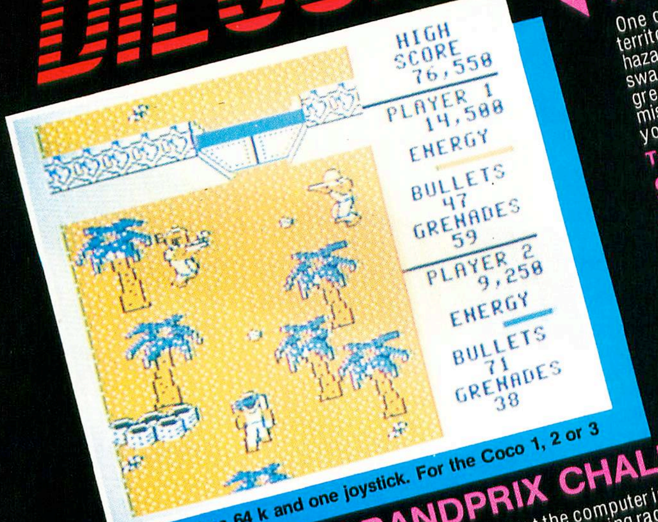
INQUIRIES AND ORDER STATUS
**(312) 278-1440**

Showroom Hours:
8:00 - 5:00 Mon. - Fri.
10:00 - 3:00 Sat.

WE ACCEPT: VISA • MASTERCARD • AMERICAN EXPRESS
C.O.D. OR CHECKS • SCHOOL P.O.'S

Shipping charges are for 48 states.
APO and Canada order slightly higher.

# DIECOM PRODUCTS INC.


HIGH SCORE 76,550
PLAYER 1 14,500
ENERGY
BULLETS 47
GRENADES 59
PLAYER 2 9,250
ENERGY
BULLETS 71
GRENADES 38

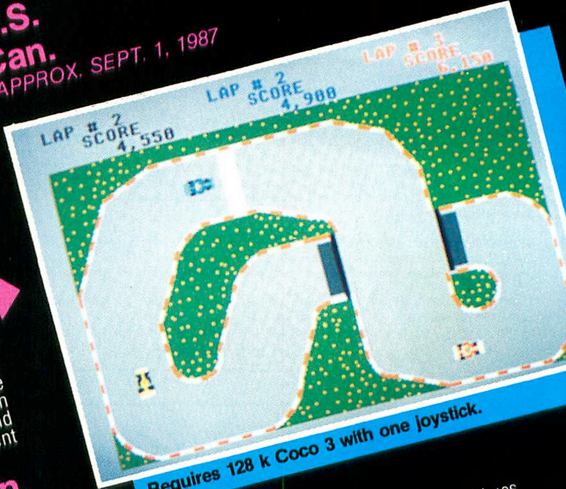
Requires 64 k and one joystick. For the Coco 1, 2 or 3

## MISSION: RUSH'N ASSAULT

One or two players can take on the mission to rescue POW'S hidden deep inside enemy territory. Watch out for enemy soldiers, snipers, grenade launchers and many other hazards as you journey farther over enemy lines. Forge your way through jungles and swamps and other hazardous terrain as you search for the missing soldiers. Pick up grenades, extra ammo and more powerful weapons as you continue farther into your mission. The enemy is out in great force to stop your mission. Dozens of screens will keep you playing for hours. Can you succeed and rescue the prisoners? Only time will tell!

Tape or Disk

**$28.95 U.S.**
**$38.95 Can.**
AVAILABLE APPROX. SEPT. 1, 1987


LAP # 2 SCORE 4,550
LAP # 2 SCORE 4,900
LAP # 3 SCORE 6,150

Requires 128 k Coco 3 with one joystick.

## GRANDPRIX CHALLENGE

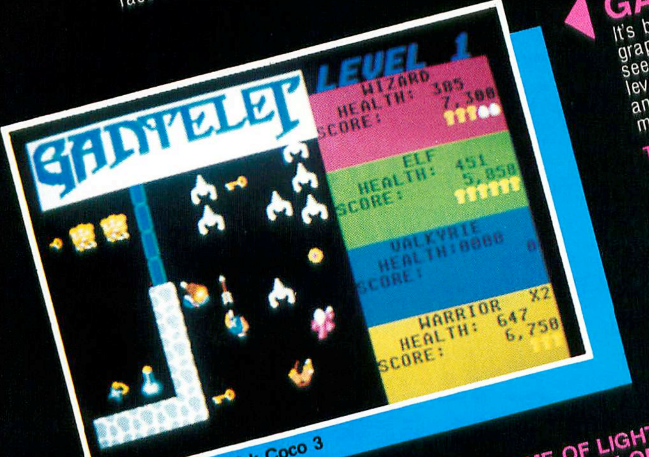
Race alone against the computer, or with a friend against the computer in this high speed racing game. You compete in 5 lap races around twisting and turning race courses. Finish the race ahead of all the computer cars and you will progress to a more challenging course. Collect repair tools as you race around the track and you will be able to increase the speed and handling of your race car. But watch out for oil slicks and water puddles on the track or you might find your car crashing into a wall. Detailed 320 × 200 graphics and realistic driving conditions make this a must for your Coco 3 collection. Many different race tracks will keep you challenged.

Tape or Disk **$28.95 U.S $38.95 Can.**
AVAILABLE APPROX. SEPT. 1, 1987

## GANTELET II

It's back and better than ever. It's Gantelet II for your Coco 3. Using 320 × 200 hi-res graphics with 16 colors, we have created one of the best arcade style games you will ever see for your Coco. Four people can now play simultaneously in one game. Dozens of new levels with new monsters will challenge even the best players. Collect keys to open doors and chests, treasures, and many new magic potions to help you battle more powerful monsters. Watch out for hidden traps as you search for the exit to next level.

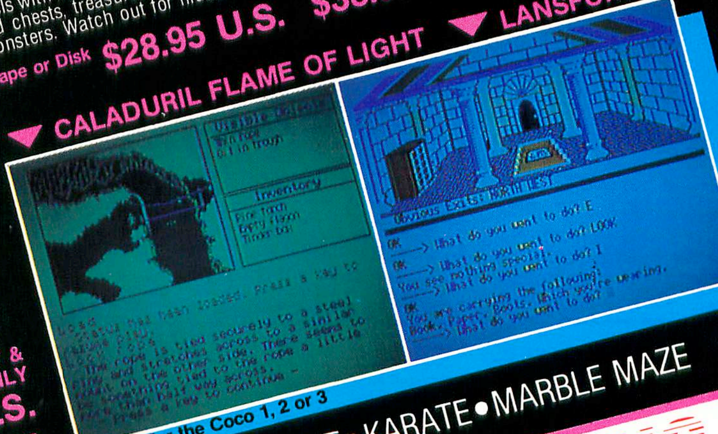
Tape or Disk **$28.95 U.S. $38.95 Can.** AVAILABLE APPROX. SEPT. 1, 1987


GANTELET
LEVEL 1
WIZARD HEALTH: 305 SCORE: 7,300
ELF HEALTH: 451 SCORE: 5,850
VALKYRIE HEALTH: 0000 SCORE:
WARRIOR HEALTH: 647 SCORE: 6,750

Requires 128 k Coco 3

## CALADURIL FLAME OF LIGHT

## LANSFORD MANSION


Inventory
Obvious Exits: NORTH WEST

For the Coco 1, 2 or 3

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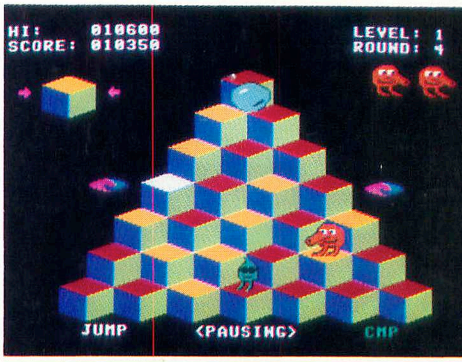

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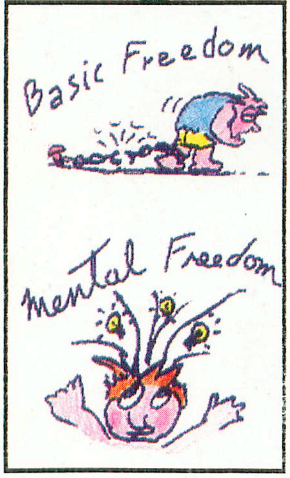
## Dr. Preble's Prescriptions



**BASIC FREEDOM!** No one wants to be chained down. And yet, if you type in BASIC programs, you have been subject to involuntary servitude! The culprit? BASIC's limited EDIT command.

**Demand Your BASIC FREEDOM!** Programmed by Chris BabCock for ColorVenture, this software gives you a **full screen editor** for typing in and editing BASIC programs! Move the cursor anywhere on the screen. Insert, delete or add text. It's the same concept as in a word processor, except you never have to leave BASIC! BASIC FREEDOM is an invisible machine language program which you can turn on and off at will. Even pressing RESET will not hurt your BASIC FREEDDOM! Simple, yet powerful with an easy to read manual. Many extra "nice touches" included, like KEY REPEAT and LOWERCASE INTERPRETER which lets you type BASIC commands in upper or lower case for ease of programming. Translation to uppercase is automatic for commands. Text in quotes is not affected. For CoCo 1, 2, or 3!

**SPECIAL COCO 3 VERSION** lets you work in 32, 40, or 80 column display modes. A separate version is available for the CoCo 1 and 2. Available on disk for $24.95 + s/h.

**MENTAL FREEDOM** by Dr. Preble! IMAGINE! Some day, a computer so advanced that it responds to your very thoughts and emotions. Imagine, some day, **thought-controlled** graphics: levitation and materialization! **PLUG IN YOUR MIND and UNHOOK YOUR JOYSTICKS**--that day is now! The Radio Shack Color Computer has many advanced capabilities, just waiting to be tapped. Dr. Preble's Programs combines the advanced technology of the CoCo with the amazing **Radio Shack Biofeedback Monitor** to bring you **"Mental Freedom."**

For CoCo 2 or 3

**THOUGHT-CONTROLLED VIDEO CHALLENGE?** Unlike any video game you have ever played, our Thoughtware tests your ability to handle stress, to remain calm under adverse circumstances. **LIGHTNING FAST** reflexes will do you no good here, unless you first tame the fickle dragon of your mind. **Are you the secretely nervous type?** Many people can keep a "Poker Face" even when they are worried so that others may not notice; but can you really stop the worry itself? Find out with **Mental Freedom!**

**AND IT TALKS!** Did you know that the CoCo can produce incredibly realistic digital speech without a special speech synthesizer? The voice quality is so good, it sounds human! Honest. Best of all, no extra hardware is needed for speech, just some clever programming by Dr. Preble.

**MENTAL FREEDOM** - Next time your friends ask what your computer can do, show them **Dr Preble's Thoughtware!** Requires Radio Shack's Biofeedback Monitor Catalogue #63-675. **Mental Freedom** - DISK only $24.95 + s/h

New!

## Vocal Freedom!

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High Quality Voice Without Synthesizer!

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* Record more than 2 minutes of speech if you have a 512K CoCo 3
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**Vocal Freedom** includes special cable. Requires only a low cost amplifier (RS cat. #277-1008) and any microphone.

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**Extra ... Hacker's Pac!**

Incorporate digitally recorded voices or sound into your own programs. Requires **Vocal Freedom,** above.

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## CoCoBraille

Emboss Grade 1 or Grade 2 Braille using your CoCo 1, 2 or 3 and a Brother Daisy Wheel printer! Fast Print to Braille conversion algorithm converts word processor files, program listings and data files into **touch readable Braille.** For use by the blind or the sighted. **No knowledge of the Braille code is necessary.** Just send print to the program and out comes Braille! Note: The complex Grade 2 conversion is very good and though not always perfect, quite readable. Requires 64K or more. Brother HR series printer or the IF-50 interface series required. Low Cost! Similar software costs 3 times as much. Only

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For CoCo 1 or 2

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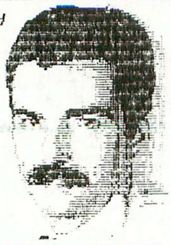

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